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THE MAGAZINE FOR INFORMATION EXECUTIVES

COVER STORY

Buying Power

A Special Focus on
IT Purchasing

ALSO INSIDE

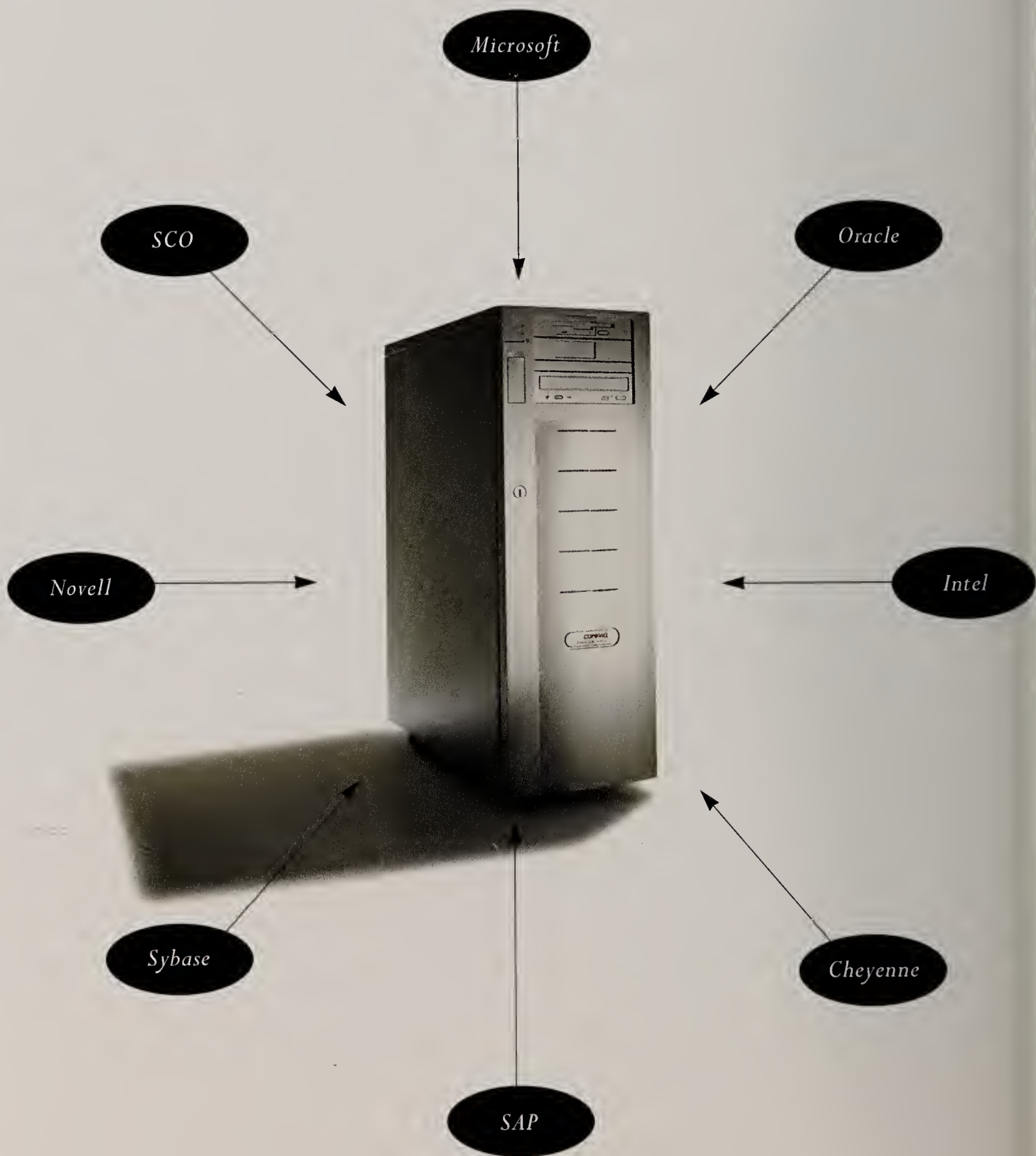
Neural Networks:
AI's New State of the Art

AN INTERNATIONAL DATA GROUP PUBLICATION

Ketchum Communications'
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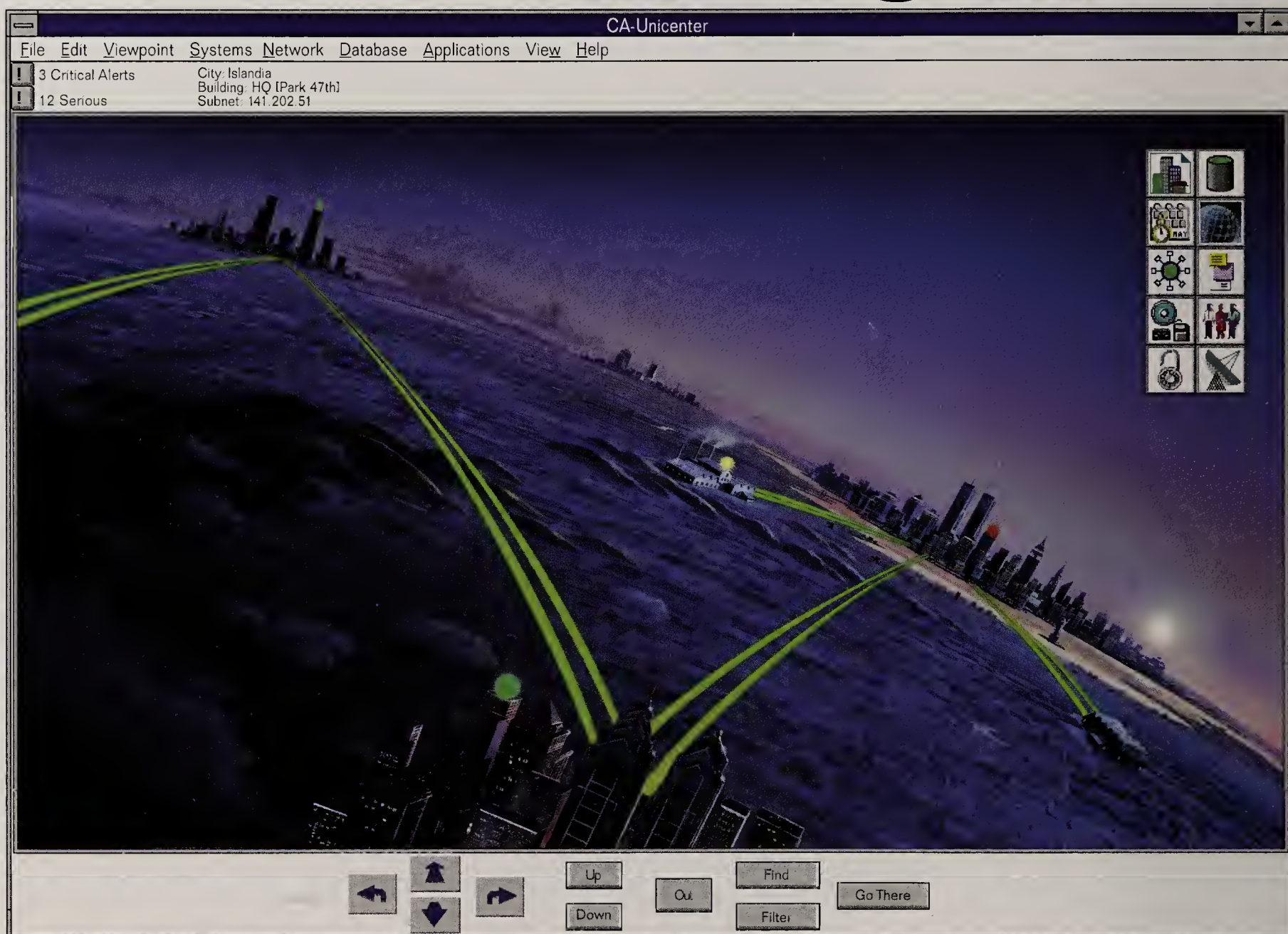
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CIO

VOLUME 9, NUMBER 7

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30

Acquiring Minds

A roundtable of IS and procurement experts looks at the changing environment for IT purchasing and its effect on the CIO role.

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After a decade of frustrated hopes and disappointments in the corporate arena, artificial intelligence is on the way up again, thanks to the increasing success of neural networks. As evidence of neural nets' power continues to emerge, one thing is clear: Strategically minded CIOs should be paying attention.

By E.B. Baatz

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What are you buying? Our research group surveyed readers and came up with a list of leading technology vendors and products in six software and hardware categories.

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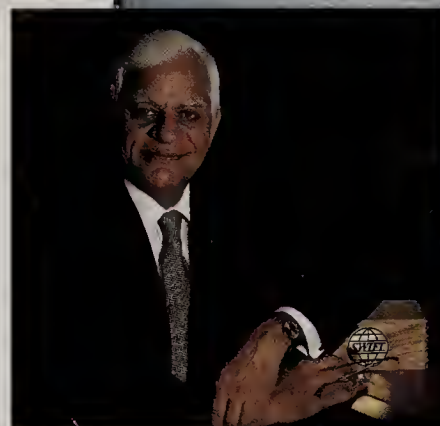
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Great Expectations

The Society for Worldwide Interbank Financial Telecommunication is a customer-owned organization whose charter is to whisk financial transactions around the globe—at any hour, error-free. Its customers want flawless service, but in their capacity as owners, they also have an eye on the bottom line. It's the IS dilemma in spades.

By Richard Pastore



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STATE OF THE ART: WHEN DOING EQUALS LEARNING

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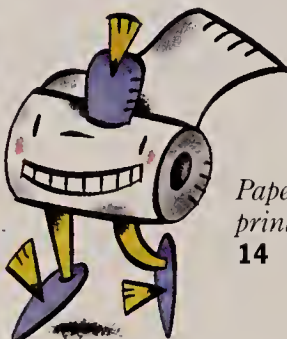
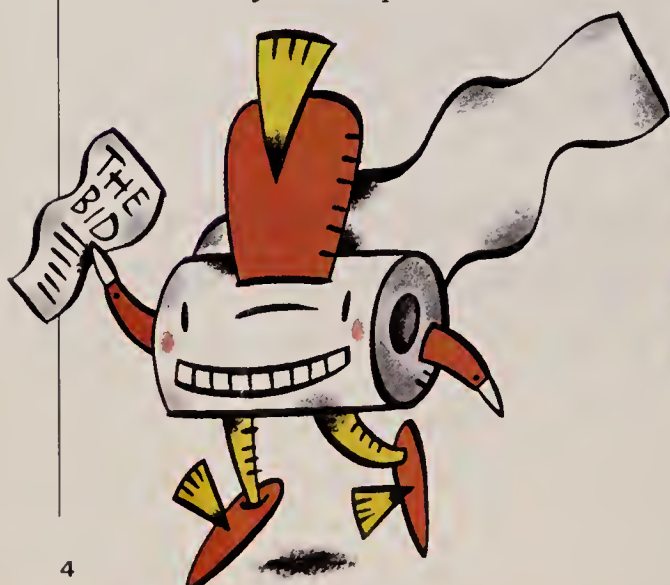
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CIO CONFIDENTIAL: THEIR METHODS AREN'T MADNESS

CIO-turned-consultant W.F. Dyle explained in a recent "CIO Confidential" column why he has little use for consulting methodologies. His new colleagues beg to differ.

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IT cost containment begins with a smart technology procurement strategy. But CIOs, who wield tremendous purchasing authority, admit that technology procurement, while increasingly collaborative, has also become more confusing and complex.

The job is devilishly complicated. IS executives are charged with selecting suppliers that can deliver the best solutions to the organization's business problems. In this process, CIOs must recommend, control and approve most of the billions of dollars spent each year on computers, communications equipment, networks, software and services.

As if that weren't difficult enough, corporate consolidations through mergers and acquisitions wreak havoc on the best-laid IS plans. In the wake of these corporate shakeups, CIOs are left to deal with the important issues of how to integrate disparate information systems in the newly formed organization, which enterprise-wide technology standards to support and how to buy IT products cost-effectively in the future. These factors cause an inevitable slowdown in the purchasing process.

Realignments in the vendor community compound the problem. For example, AT&T's decision last fall to split into three independent companies has big implications for buyers of AT&T telephone equipment and services. The breakup has raised the level of uncertainty among AT&T's corporate customers. They fear that specific products may be discontinued, product support may vanish or product innovation may suffer. Some influential IT decision makers are privately wondering whether to continue to buy from AT&T or to look for other suppliers.

To streamline the process, many companies are developing preferred-vendor programs. For instance, one CIO I recently spoke with told me that his organization, which is populated with thousands of different PCs, decided to reduce the number of approved PC suppliers from seven to one. The benefits? Standardization, vendor leverage, simplified and more attentive service, tighter control of desktop assets, ease of software distribution and lower cost. (With its increased leverage, the organization is now buying 100MHz Pentium machines for less than the cost of a 486/66.)

To probe IT procurement challenges *CIO* Contributing Writer Mickey Williamson assembled a roundtable of purchasing experts. Their insight and advice begin on Page 30 in "Acquiring Minds."

Also in this issue you'll find our third annual Readers' Choice Awards in which *CIO* readers tell us what they're buying in six hardware and software product categories—and why.

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Editorial Offices CIO Communications, Inc., 492 Old Connecticut Path, P.O. Box 9208, Framingham, Mass. 01701-9208 (508) 872-0080, FAX (508) 879-7784. Printed in the U.S.A.
Subscriber Services (800) 788-4605, FAX (508) 872-0618
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"I believe that today's CIO has to be an astute diplomat. The CIO has two masters to serve as he or she tries to balance diverse and sometimes mutually exclusive demands."

—Glenn Gow
Managing Director
Crimson Consulting Group

Technology procurement can be a real tug of war. On one side, you have end users clamoring for the latest "hot" software from a vendor that is not on your contracted vendor list. On the other side, you have a corporate mandate to standardize on all technology acquisitions. It takes more than muscle to emerge

victorious in the procurement battle; it takes tact, diplomacy and the ability to adapt to change.

In "Acquiring Minds," beginning on Page 30, four experts explore the role of the CIO in technology procurement and offer sound advice for dealing with the growing complexity of the acquisition process. Gow recommends that CIOs can best manage the process if they are flexible. "CIOs can still set corporate standards, and they should as long as they do so in concert with their users and senior management," he says. "They should also be willing to change standards as users change the requirements."

Other hot spots in technology procurement today, such as complex software contract negotiations, global diversity and decentralized decision making, are all discussed in this frank exchange of methods, ideas and advice. One interesting aspect our panelists touch on is the use of competitive benchmarking. It seems many organizations are tracking their vendors' performance in relation to the performance of vendors serving their competitors.

And to help you do a little vendor benchmarking of your own, see what your peers say are the best products on the market today. Be sure to check out the winners of the 1995 CIO Readers' Choice Awards, beginning on Page 42.

Glenn L. Gow

P.S. Be sure to join us March 17-20 at the spring CIO Perspectives Conference, "The CIO and Cyberspace: The Business/Technology Intersection," in Naples, Fla. We will explore the executive's role in Web and Internet corporate initiatives. For more information, call 800 366-0246.

Coming In CIO

Above and Beyond

Some executives implement new products or new systems; others turn those products and systems into measurable return on investment and value to their organizations. In this year's special issue on our Enterprise Value Awards, CIO will profile those information technology architects who inspire business solutions within their own companies and perhaps beyond, through pervasiveness of information technology, return of value to the enterprise and partnership between IT and business executives.

Battle of the Big Brothers

The expanding reach of IT fuels a clash among big businesses, government, the legal system and private citizens over the control of "private" information—addresses, phone numbers, medical records, religious affiliation, buying habits and the like. Anne Wells Branscomb, author of *Who Owns Information?* (BasicBooks, 1994), talks about loss of privacy, technology's legal loopholes, and the good and bad sides of sharing information.

Pay Check

Budgets of more than \$100 million, staffs of more than 51 subordinates and companies with more than \$1 billion in sales are some similarities among IT's highest-paid executives. CIO's survey of 957 IT executives also found an average salary of \$97,900 and a top annual salary of \$850,000. Look for more details—and some surprises—in the 1995 Executive Compensation Survey.

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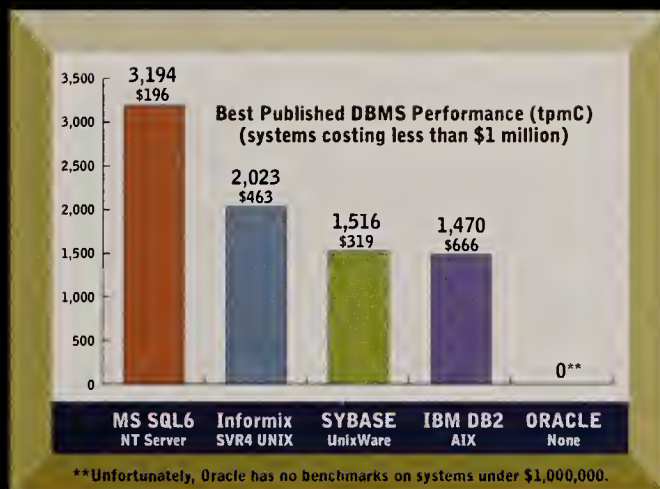
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Sure it's hard to believe, but so was Columbus.



*TPC results as of November 29, 1995. Microsoft results based on Digital AlphaServer 2100 5/300 c/s and Windows NT Server 3.51. Informix results based on Unisys U6000/500 Model 50 c/s on System SVR4 UNIX 1.4. Sybase results based on Compaq ProLiant 4500 5/100 Model 1 and UnixWare 2.0. IBM results based on RS 6000 POWERserver R24 c/s and AIX 3.2.5 ©1995 Microsoft Corporation. All rights reserved. Microsoft is a registered trademark and Where do you want to go today? and Windows NT are trademarks of Microsoft Corporation. Compaq is a registered trademark and ProLiant is a trademark of Compaq Computer, Inc. Digital is a trademark of Digital Equipment Corporation. AIX is a registered trademark and POWERserver is a trademark of International Business Machines Corporation. Unisys is a registered trademark of Unisys Corporation. UnixWare is a registered trademark of Novell, Inc. TPC is a registered trademark of Transaction Processing Performance Council. UNIX is a registered trademark in the United States and other countries, licensed exclusively through X/Open Company, Ltd. All other trademarks are the property of their respective owners.

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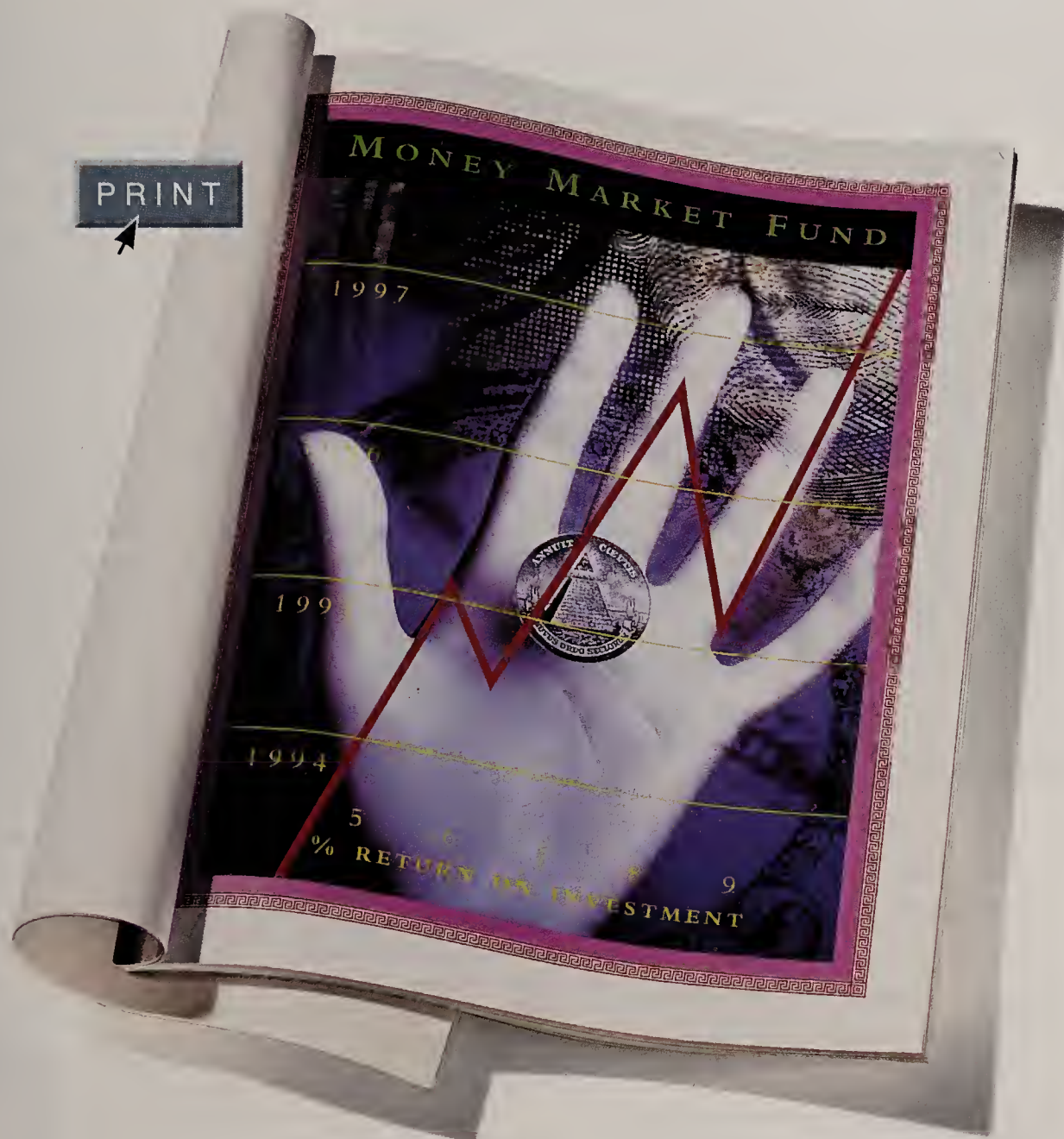
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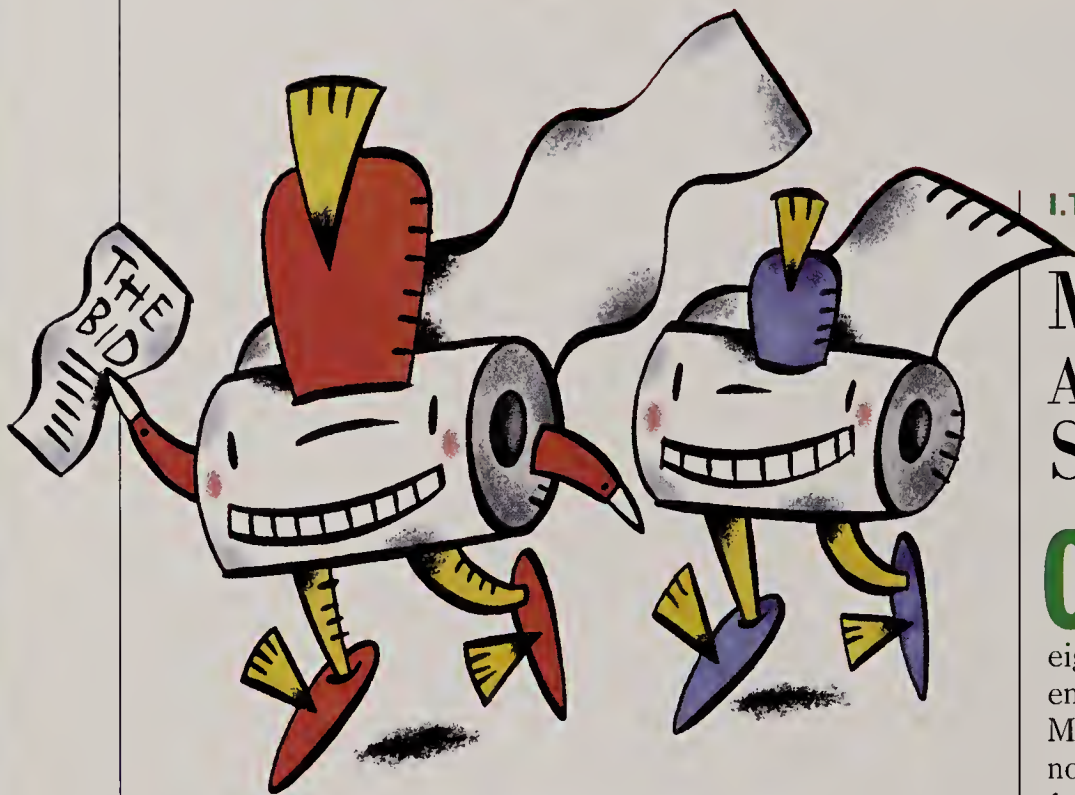
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PRINTERS ON PARADE

The same technology that saved the federal government more than a billion dollars in printing procurement costs over the past five years is now available to private corporations. ABC/BidsPlus, a Chambersburg, Pa.-based printing consultancy, has developed a network to match companies with printers in just a few hours and at far less cost than manual methods of procurement.

When a company wants to outsource a printing project, it contacts the BidsPlus staff with specifications via e-mail, fax or hard copy. The staff standardizes the technical details, classifies the job according to size and complexity and enters the information into an image database system.

Depending on the company's preferences, BidsPlus either automatically forwards a notice of the job to select printers who fit the proper classification or sends out a general online or faxed announcement to all printers in the country. Interested printers can get further details by dialing directly into the database system and inputting their fax numbers or e-mail addresses.

If a printer decides to pursue the job, it sends its bid to the outsourcing company, which presumably chooses the lowest bidder. ABC informs all other responding printers about the winning bid so they can adjust their bids accordingly the next time around. This service is free for most companies; printers pay a monthly fee to participate in the network. For more information call BidsPlus at 800 288-8250. ■

I.T. ACHIEVEMENT

MOVERS AND SHAKERS

One person's good idea can have a far-reaching impact. Consider the eight recipients of the seventh annual Achievement in Managing Information Technology Awards. This year's four gold winners and four silver winners—who represent the financial and health care industries, academia and government—conceptualized large-scale, mission-critical projects that improved productivity, reduced costs or secured a competitive advantage. The awards, cosponsored by American Management Systems (AMS) and Carnegie Mellon University's Graduate School of Industrial Administration, recognize individuals who have made outstanding contributions to their organizations, and often their industries, through the effective use of information technology.

This year's gold winners:

Dennis Gillings
Chairman and CEO at Quintiles Transnational Corp., Morrisville, N.C.

Success in the highly competitive pharmaceutical industry depends on how quickly new medicines are brought to market.



Gillings' new international contract research company, Quintiles Transnational, helps pharmaceutical companies reduce time to market with a worldwide network of preclinical and clinical drug research information management systems. The network is built around four key elements: human expertise, hardware for electronic linking, software to streamline and standardize tasks, and operating procedures. IT is used to manage the vast amounts of data generated during drug development and thus improve the chances for Quintiles' clients to gain timely regulatory approval of new drugs. Gillings' system departs from the traditional approach to drug development by focusing on the end goal of a drug-approval regulatory application instead of going through the process of designing experiments, contracting with doctors, studying patients and finally assembling results in a new drug application.

David J. Sexton
CIO at State Street Bank and Trust Co., Boston

Over the past 20 years, State Street Bank and Trust Co. has transformed itself from a New England-based commercial bank to a manager and servicer of financial assets worldwide, thanks in no small part to Sexton's vision. Before Sexton harnessed IT as a solution, State Street's



Purina Mills Satisfies Data-Hungry Decision Makers with the SAS® System

Every business day, information managers at Purina Mills—America's leader in animal nutrition—satisfy a different kind of craving: the need of top executives to get their hands on strategic information to support better quality decisions.

Luckily, they've cut preparation time substantially since adding SAS software to their menu of productivity tools. "Comparing the SAS System to anything else we've ever used to analyze business data, I'd say SAS software is by far the best," says Gerry Dagnault, Region Controller. "There was a time when we had to do things manually. But today, we can review many aspects of our business just by pointing and clicking."

Purina Mills relied on the SAS System to build client/server applications now in use by field representatives and managers at specific manufacturing locations. Dagnault adds that "SAS software is so simple to use that even those managers and executives who have not previously used computers feel right at home."

Feeding Decisions at Every Level

According to Mike Durbin, Supervisor of Information Services for Purina Mills, his department needs to get information to managers as quickly as possible, who in turn must deliver relevant details to upper management as quickly as possible.

"We use SAS software in many areas of operation including budgeting, research, and as a management support tool," says Durbin. "Activities include tracking customer volume, current income, and comparative analyses of income year-by-year."



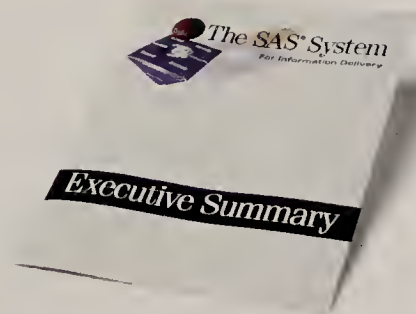
Dagnault, Brown, Durbin

**Serving Up the Right Information...
at the Right Time**

Connie Brown, Purina Mills Information Analyst, says the key business benefits of using the SAS System are "improved productivity by key field management and a consistent thought process in the use of management information. There is no question that field management spends less time gathering numbers and more time using good information to support the decision process. Mapping and graphical presentations are becoming more important in the decision process, and SAS Institute has been very supportive in helping us implement these tools."

"SAS software is doing the job for us," Dagnault concludes. "All of our directors will eventually have it available."

To receive a SAS System Executive Summary, give us a call or send us E-mail at cio@sas.sas.com



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TRENDLINES

business strategy of global growth was hindered by hidden currency and tracking risks. Yet designing a system to support multicurrency accounting seemed unlikely, given that other companies had failed to create a purely domestic financial accounting system and that there was no clear agreement in the financial industry itself about how to define a multicurrency accounting standard.

Sexton and his team overcame these challenges and defined a standard for multicurrency accounting that is the basis of a new transaction processing system called Multicurrency Horizon. The system integrates basic custody recordkeeping with multicurrency accounting and has provided a foundation for State Street to execute its strategic vision.

After Multicurrency Horizon was fully implemented, Sexton went on to create Global Horizon Interchange, an advanced architectural component for the system. Based on relational databases within a network, it enables customers to access global transactions, retrieve information and have access

to data on their desktops through State Street's architecture.

Albert Aiello Jr.
*President at Fidelity Systems Co.
CIO at Fidelity Investments Inc., Boston*



As the nation's largest mutual fund company and second-largest discount brokerage firm, Fidelity Investments offers a broad range of financial services to both institutional and retail customers, often selling directly to the public. Fidelity's primary interaction with individual customers is through a force of several thousand telephone representatives. When Aiello joined Fidelity in 1990, he began upgrading and automating the company's phone center systems and technology to meet customer needs and to support growth. His efforts have moved Fidelity from a product-focused to a customer-focused business model.

Customers can now reach Fidelity 24 hours a day, sev-

en days a week. The majority of customer calls are handled by a voice response system that can execute trades as well as provide product and account information. Callers needing additional assistance can speak to a Fidelity representative who has immediate access to all of the caller's relevant information through an advanced workstation. A new voice-data integration capability ensures that the customer's record appears on-screen when the call comes in. In addition, Fidelity representatives can reference market and product information and financial planning tools on the workstation to provide complete customer information and assistance.

Larry D. Grandia
Vice President of Information Systems and CIO at Intermountain Health Care, Salt Lake City



To help Intermountain Health Care, a not-for-profit integrated delivery system, face the challenge of attracting new managed-care enrollees while satisfying already enrolled members and patients, Grandia developed a clinical management system named "HELP." The system aggregates clinical data for each hospitalized patient, providing physicians and other caregivers with timely, integrated information and enabling them to develop clinical decisions for optimal care.

Nurses and therapists can

enter data through bedside terminals as they examine a patient. Instruments such as lab equipment or patient-monitoring devices transmit information directly to the integrated patient database. HELP uses expert systems

technology to apply rules to patient-specific data and create computer-generated reminders and alerts to caregivers. For example, if a new laboratory result entered in the database indicates that a patient has low potassium, HELP will electronically notify the physician that the course of therapy should be altered to address the problem.

Grandia also used electronic data interchange capabilities to improve nonclinical processes such as materials management, centralized accounts-receivable management, purchasing systems and claims submissions.

This year's silver winners were impressive as well. **Christopher J. Culbert**, chief of the client/server systems branch at NASA's Johnson Space Center in Houston, introduced two new training technologies expected to save NASA millions of dollars per year. **Rollin W. Ager**, director of the Bureau of Information Technology at the Wisconsin Department of Industry, Labor and Human Relations, developed a system to revamp the process of filing unemployment insurance claims. **John P. Glaser**, vice president of IS at Brigham and Women's Hospital in Boston, oversaw BWH's mi-

By 2005, the number of PCs in U.S. landfills will equal 15 Empire State Buildings piled on top of one another.

—Carnegie Mellon University study

OFF THE RECORD

Paragon Cable in New York (recently acquired by Time Warner Cable, also in New York) used a novel strategy to collect overdue bills from customers, according to the Oct. 8, 1995, Telecommunications Policy Review. Instead of incurring the costs associated with unhooking the cable and reconnecting it, Paragon ran C-SPAN on all 77 channels until the customer paid up. Although this was the most

effective bill-collection measure yet, according to the report, Time Warner has decided not to continue the practice.



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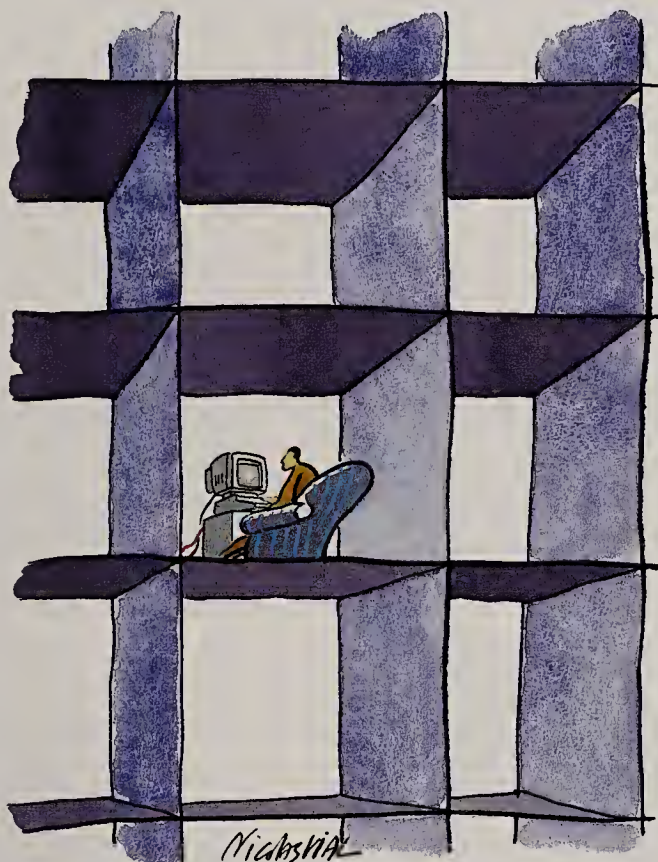
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—Jennifer Bresnahan

A SHRINK-RAPPED EVALUATION

Few people would argue that big-city police officers have it rough. The strains of dealing with urban crime and violence can take their toll. And with a group that is armed and trained in the use of force, that strain can have some pretty alarming effects.

The Chicago Police Department's internal affairs group wanted to be able to identify and subsequently treat officers' stress before it got too severe. So, it contracted with California Scientific Software in Nevada City, Calif., to develop a neural network system to predict which cops might need counseling. (See related story, Page 22.) Detailed personnel records from more than 2,000 present and former officers—including data such as recorded sick days, promotions and information about who had been reprimanded for violating rules—were fed into the system. By comparing the records of dismissed cops and competent ones, the computer "learned" which signs indicate that a deputy is headed for trouble and spat out names of 90 officers whose records indicated a need for counseling. The local police union, naturally, was not wild about the software.

Using neural nets to predict human behavior raises all sorts of ethical questions, which sociologists and psychologists as well as the computer experts who program the systems have yet to explore fully. The old adage "garbage in, garbage out" applies to neural network systems as much as to other computer programs. And the difficulty of tracking exactly how the neural net arrives at an answer makes the software difficult to employ for things like police counseling or bank loan approval processes, where people expect an explanation for what they're told.

Police union officials in Chicago succeeded in curtailing the information given to the computer. Now brutality allegations are entered only if they have been substantiated, which has cut the number of officers slated for counseling to 40. The department plans to extend the computer review to 12,000 employees. ■

MULTIMEDIA

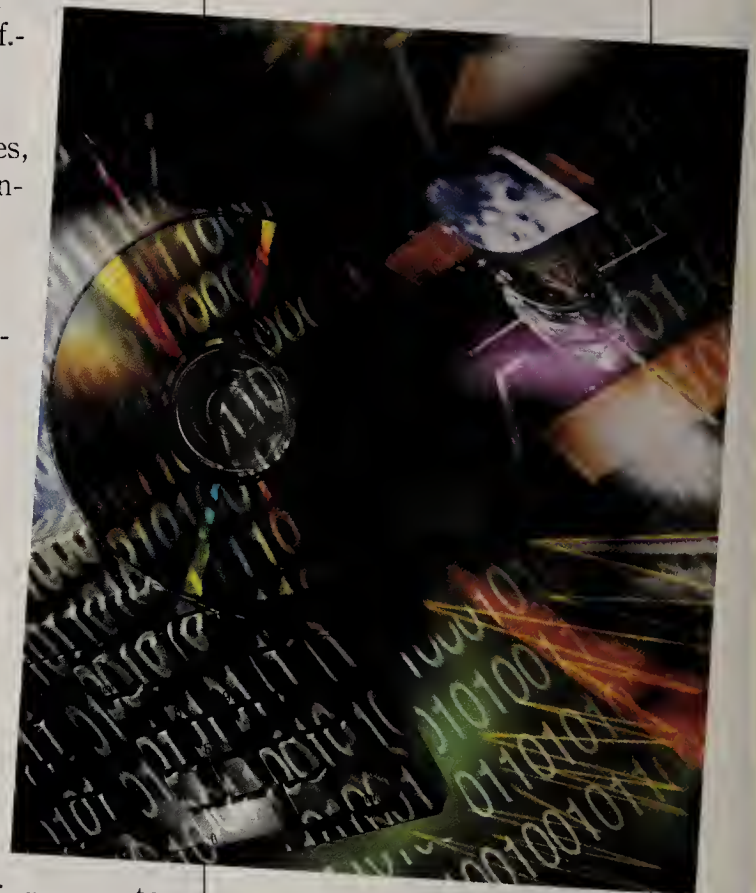
SPREADING THE STATE OF THE ART

Bay Area Multimedia Technology Alliance (BAMTA), a Santa Clara, Calif.-based nonprofit consortium of private companies, government agencies and educational organizations, says networked multimedia "will change the way we live, work and play." Launched last year, the organization, which includes 49 members from across the nation, intends to accelerate the development of the technology by providing access to state-of-the-art equipment to schools and industry groups and encouraging partnerships among its members. If its first projects are any indication of what lies ahead, networked multimedia will indeed permeate everyday life.

With BAMTA's technical support, the following projects are possible:

- Students in California are designing educational products and an interactive multimedia math and science curriculum for grades K-12. The students access multimedia development tools at BAMTA's facility from their classrooms.
- An alliance of insurance companies, employers and

health-care providers—the Consumer Healthcare Access Multimedia Project (CHAMP)—plans to provide consumers with interactive health services, information and communications links. According to CHAMP, studies show that up to 80 percent of visits to physicians are unnecessary, and



many could be avoided if people had the proper health education tools. If consumers can get medical information and advice online, the reasoning goes, they'll be more proactive about their health.

■ NASA aims to develop virtual labs to enable scientists in far-flung locations to collaborate on the agency's projects. Currently, NASA requires researchers to convene at one location for the duration of each project, forcing many to relocate for several years.

Other organizations could emulate these projects as networked multimedia gains prominence, says Neal

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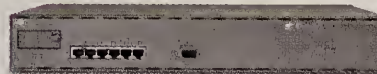
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Chandra, BAMTA's president and CEO. BAMTA's state-of-the-art multimedia infrastructure—which can be used on-site or accessed remotely—provides networking capability between test sites as well as Internet, video and database servers.

It also acts as a showcase for members to display their work, Chandra says.

For networked multimedia to succeed, several industries, including hardware, software, networking, telecommunications and content providers, must collabo-

rate to create, manage, transport and use digital content. Although it's not a standards-setting organization, BAMTA hopes to grease the skids in that area, too. For more information, contact BAMTA at <http://www.bamta.org>.

—Peter Fabris

SOMEONE TO WATCH OVER YOUR INTERNET CONNECTION

Your company's new Internet connection may impress your clients and send your competitors scrambling to keep up with you. But now that your employees are primed to boldly surf where no employee has surfed before, how will this newfound access affect productivity?

"The Internet offers tremendous resources and opportunities to business," says Nigel Spicer, president of Microsystems Software Inc. in Framingham, Mass. "However, these opportunities can distract employees, affect productivity and endanger the integrity of the network."

To address those concerns, Microsystems Software has released Cyber Sentry, a productivity-management tool that monitors Internet access on the corporate network.

Cyber Sentry controls access from any Windows network that uses such Winsock-compliant Internet-access applications as Netscape, The Microsoft Network, CompuServe and Mosaic. The product maintains a list of Internet protocol addresses that are used by the network; it can be set up to add addresses as they are accessed or

to block access to unauthorized addresses.

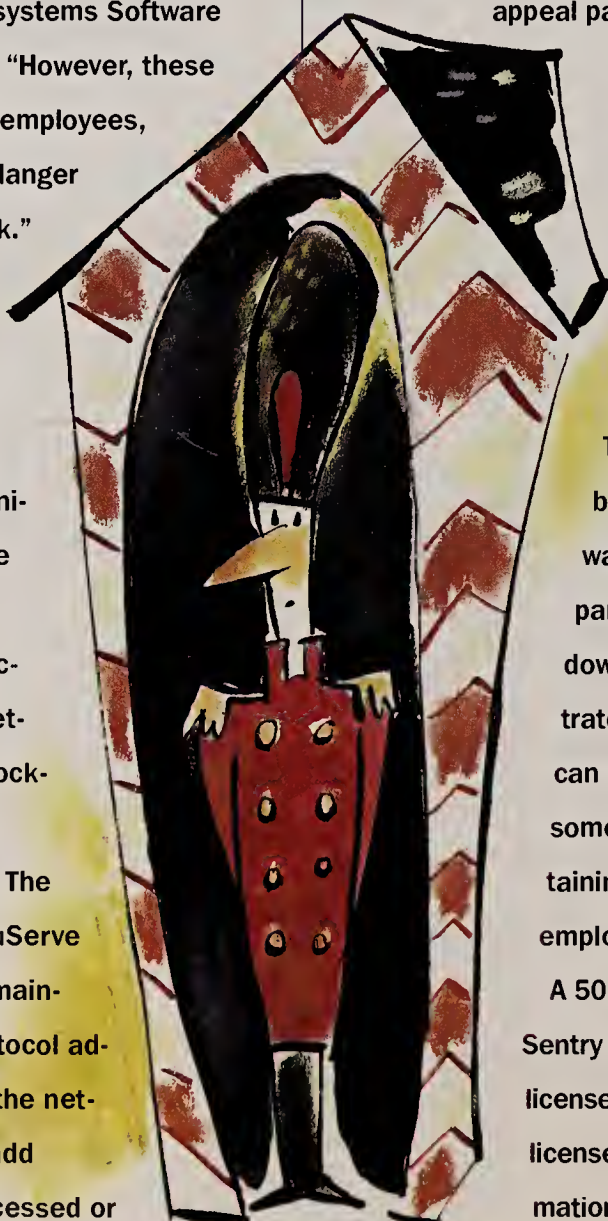
User companies can control the number of concurrent users and generate reports on daily, weekly and monthly Internet use by individual or department. The product restricts downloads to the network, limiting the use of unlicensed software as well as reducing the risk of viruses.

The product's "CyberNot Block List" should appeal particularly to school sys-

tems. It provides the names of researched sites containing material such as nudity, racist propaganda, gambling and information on drugs and drug culture.

The list is updated weekly by a Microsystems Software team of managers, parents and teachers and downloaded to the administrator's workstation. The list can be customized to offer some sites, such as those pertaining to leisure and sports, to employees after hours.

A 50-user license for Cyber Sentry costs \$695, a 100-user license is \$995 and a 250-user license is \$1,295. For more information, call 508 879-9000.



PROCUREMENT PRACTICES: LETTERS OF INTENT

IT professionals involved in procurement activities should avoid letters of intent, which can be construed as contracts, according to "Tools & Tactics," a monthly newsletter from International Computer Negotiations Inc. in Winter Park, Fla. But if you must write one, the organization cautions, you can protect yourself by following this advice:

- Have legal counsel prepare it or, at the very least, review it.
- Do not accept a letter of intent from a supplier. Ever.
- Be brief and to the point.
- Use generic terminology. Do not refer directly—by name or number—to a supplier's agreement.
- Include a paragraph that states plainly the nonbinding nature of the letter.
- If you must go into detail, just do a final agreement instead.

For more information, call ICN at 407 740-0700.

CORRECTION:

Our Dec. 1, 1995, story "CIO Search and Rescue" contained an incorrect phone number for the U.S. General Accounting Office report on IS best practices. The correct number is 202 512-6000. We apologize for the inconvenience.

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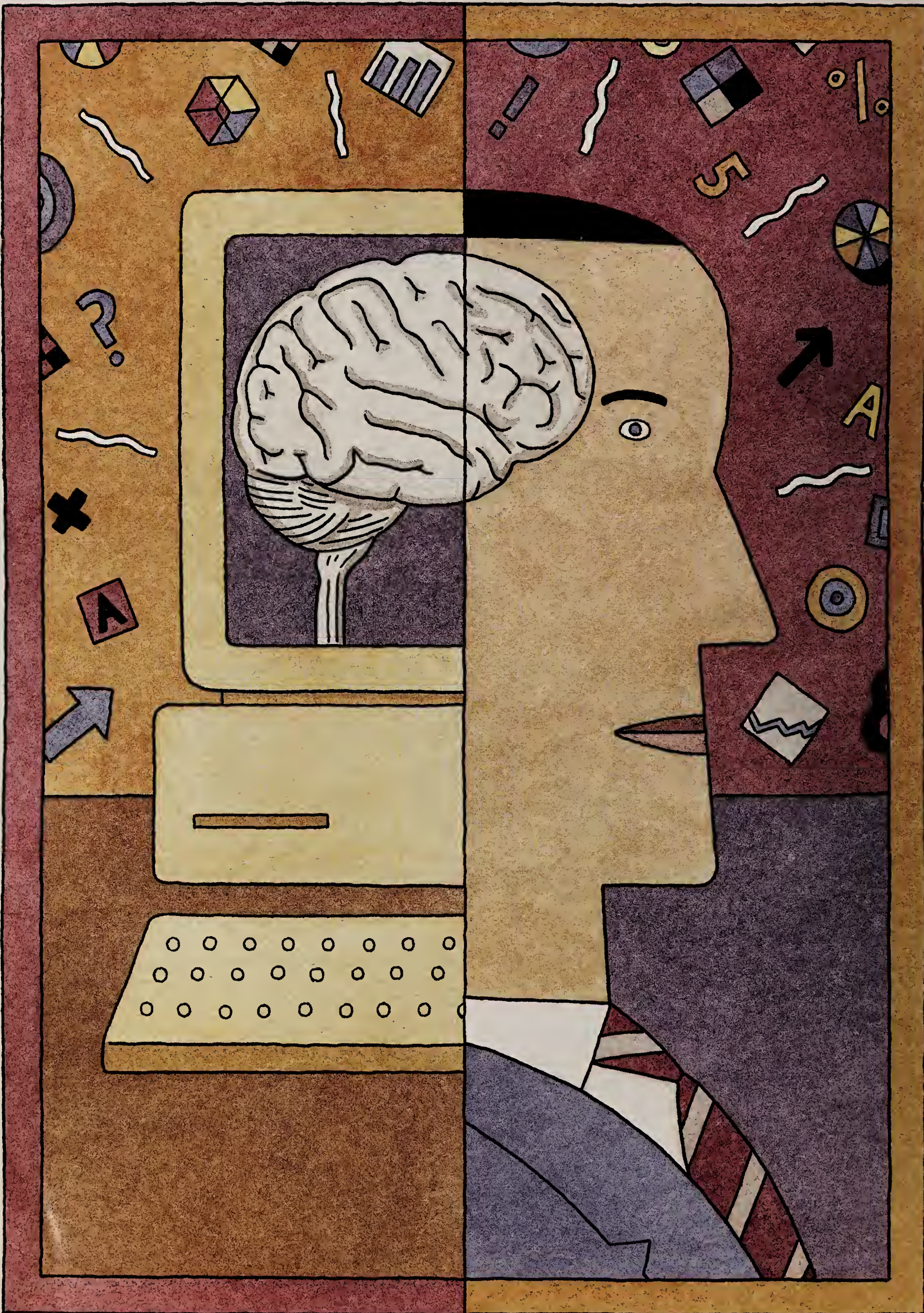
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Making Brain Waves

NEAR NEW MEXICO'S barren desert flats, mathematicians and scientists at Los Alamos National Laboratory work into the night to create a hybrid neural network computer program for MasterCard International Inc. Scheduled to go into production in 1996, the million-dollar software investment is expected to put MasterCard one up on its arch rival, Visa International. Down the road from Disney World in Orlando, Fla., a little-known private company called Med-AI Inc. installs an avant-garde neural net program at Florida Hospital to help medical staff diagnose heart attacks. Although the doctors initially need some persuading, the hospital group's chief financial officer, who sees in the system cost savings critical to his company's survival, gives it his full blessing.

In the political corridors of the Windy City, when local union officials hear about the new neural network program the Chicago Police Department has commissioned, they are livid and ridicule the software as "management by crystal ball." Nonetheless, the personnel department deploys the controversial computer code in an effort to root out rogue cops (see Trendlines, Page 14).

Nestled in the foothills of the Berkshires in Pittsfield, Mass., Kay-Bee Toy Stores' director of market research approaches his chief financial officer about spending \$10,000 for an innovative, neural network-based forecasting and statistical package. The software will put traditional statistical techniques in the shade and reveal a hitherto unknown connection between Kay-Bee's sales and rival Toys 'R' Us Inc.

Organizations everywhere are investigating, investing in and deploying a truly revolutionary new breed of computer software based on neural networks. Neural nets are artificial intelligence (AI) systems that are loosely modeled on the way the human brain works, processing large amounts of data to "learn" solutions to problems.

Expensive and often failed AI business applications in the 1980s included mostly expert systems, computer models that attempt to re-create an expert's knowledge in a codified set of rules and statements. In the '90s, despite AI's recently tarnished reputation, neural network-based systems, some sold in shrink-wrapped packages for surprisingly little, appear to be well on their way to assuaging corporate aversion to artificial intelligence.

After a decade of frustrated hopes and disappointments in the corporate arena, artificial intelligence is on the way up again, thanks to the increasing success of neural networks.

As evidence of neural nets' power continues to emerge, one thing is clear: Strategically minded CIOs should be paying attention.

BY E.B. BAATZ

"Neural networks are a dream come true," says Neal M. Goldsmith, who was instrumental in deploying American Express Co. Inc.'s AI systems in the 1980s and is now president of Tribeca Research Inc. in New York. Rule-based expert systems, such as the famous American Express "authorizer's assistant," are giving way to or being merged with models like neural networks, also known as biologically based systems for their similarity in structure to the human brain.

Neural nets are gaining ascendancy because reports of their success, particularly in financial markets, have begun leaking out to the world at large. Furthermore, "neural nets are quantitative, numerical and don't require a knowledge engineer to extract expert information," says Goldsmith.

Because expert systems require such intensive use of staff time to extract and code human expertise, they are "antithetical to the culture of corporate America," Goldsmith explains. Neural nets, on the other hand, "fit right in" because their main requirement is just large amounts of data.

SO WHAT EXACTLY is a neural network? In the fullest sense, it's a computer architecture (comprising software, hardware or both) modeled on the way the human brain processes sensory stimuli. Most traditional computer programs use statements that take the form, "if this, then that." A solution is achieved via a series of deductive steps, with given instructions executed one at a time. Neural networks, on the other hand, are inductive programs; they take in a great amount of information all at once and then draw a conclusion. The programmer first gives the system some training data with known conclusions. That helps the program learn the correct solutions by example. The more data fed into the computer—which may or may not be a traditional digital computer—the better the results.

A neural net involves large num-

bers of sensing and processing nodes that continuously interact with one another. Between each pair of nodes sits a nonlinear transfer function, such as a numerical weight, that helps determine the final conclusion. As the neural net learns through the input of data, the weights are tweaked for a better solution. Ultimately, the network learns the solution itself.

For example, information on patients admitted to a hospital emergency room might include age, weight, sex, temperature, pulse rate, location and severity of pain, diet and so on. This data is the input to

the neural network. The output, in the case of the net application developed by Med-AI for Florida Hospital, is the diagnosis.

The system was first fed data from past patients along with doctors' analyses of attack severity. As new patient data is entered into the system, the software compares the network output and the training example output, making changes to the weights of the nonlinear mathematical models until the software becomes more likely to produce the right prediction about whether the patient is having a life-threatening heart

Neural Net Capital

Many technology vendors are working with neural networks. The following list is a sampling of those in the market and is not intended to be comprehensive.

Adaptive Solutions Inc., Beaverton, Ore., 503 690-1236. Neural network software and massively parallel hardware for such pattern classification applications as weather, handwriting, speech and stock market analysis.

AI Ware Inc., Cleveland, 216 421-2380. Unix- and Windows-based optimization software, including neural networks, fuzzy logic, genetic algorithms and expert systems for the chemical process industry.

California Scientific Software, Nevada City, Calif., 916 478-9040. DOS-, Macintosh- and Windows-based neural network software for financial forecasting and medical research like cancer cell analysis.

Cheshire Engineering Corp., Pasadena, Calif., 818 351-0209. Macintosh- and Windows-based neural network software with genetic algorithm training tools for use in financial forecasting and engineering applications.

Cogito Software Inc., Pine River, Minn., 218 587-3120. DOS-based neural network software used for research in academia and the high-tech industry.

HNC Software Inc., Mira Mesa, Calif., 619 546-8877. DOS-, Windows- and Unix-based neural network software, hardware and plug-in boards for use in banking industry applications like fraud detection, property appraisal and direct-mail analysis.

Nestor Inc., Providence, R.I., 401 331-9640. DOS- and Windows-based neural network software and hardware used for imaging applications by high-tech companies.

NeuralWare Inc., Pittsburgh, 412 787-8222. DOS-, Windows- and Unix-based neural network software; genetic algorithm training tool for neural networks in manufacturing control applications.

Pavillion Technologies Inc., Austin, Texas, 512 250-3150. Neural network and fuzzy logic software for use in paper, chemical and refining industries.

Right Information Systems Inc., Newbury, Mass., 800 803-0933. Windows-based neural network software for mathematical-modeling business applications.

Ward Systems Group Inc., Frederick, Md., 301 662-7950. Windows-based neural network software for prediction and optimization applications in many different industries. —E.B. Baatz



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"Neural network statistical models are nonlinear," explains Steve Epstein, co-founder and president of Med-AI. "When you assume the world is linear, as most traditional statistical regression analysis does, then you assume data points are equidistant." So, for example, in a medical application, patient outcomes might be coded as "one," meaning the patient goes home standing up, "two," meaning the patient goes home in a wheelchair, and "three," meaning death. Implicit in that coding is the assumption that going from one to two is just as bad as going from two to three, which of course is not the case.

In such an application, nonlinear statistics yield more sophisticated and more accurate predictions than do linear analyses because they allow for varying differences between points. Nonlinear models require much more computer processing power, but with that power now on the desktop, biologically based computer models are competing with and often beating structured computer programs.

That's not widely known, partly because the technology is not something many people understand. Also, those CIOs who do know are finding the systems so strategic that they aren't keen to spread the word. "Gannett, Boise Cascade, Thrifty, Wal-Mart—they are all doing it," says Robert Tipton, director of technology for Chicago-based consultancy Whittman-Hart LP. "The people who are using neural net technology for the most part are not talking about it, but they are having some great successes."

DESPITE THE secrecy, neural networks are nothing new. The technology has been kicking around for 40 years (as has the controversy about whether machines can ever replicate human intelligence), having taken off in the 1950s, when it was first applied in signal processing applications

developed for the military. But in the '60s and '70s, the field suffered from increasing competition for research funding, and the brainy pioneers of AI duked it out for Department of Defense grants. Proponents of symbolic, rule-based AI, from which knowledge engineering and expert systems emerged, often won out over their rival's biologically based neural computing models, earning the majority of research dollars and media attention.

Then, in the '80s, riding a rollercoaster of hype that led to false expectations and frustrated venture capitalists, the phrase "artificial intelligence" took a nasty plunge into the trash heap of cool technologies that went nowhere. The technology that was supposed to transform the way the world worked was overshadowed by plain-vanilla personal computers and financial spreadsheet applications. Corporate America had better things to do than pursue the dream of making a machine think like a human.

"At one time, there were more than 400 companies in the U.S. [developing] in artificial intelligence," says Harvey Newquist, New York-based author of *The Brain Makers* (SAMS Publishing, a division of Prentice Hall Computer Publishing, 1994). "Today it is less than half that, and many firms are down to two or three people." Nevertheless, advances in neural network technology have proceeded, and the number of applications in use is growing.

Indeed, neural networks have become embedded in everyday equipment such as washing machines in Japan, truck brakes on U.S. 18-wheelers, the bomb detector at JFK Airport and hydroelectric plants in Canada. Semiconductor companies are developing chips that will turn

conventional computers into super-fast neural networks. Intel Corp., Hitachi Data Systems Corp. and AT&T Bell Laboratories, as well as lesser-known companies, have all developed neural network chips. Computers that can read handwriting, recognize faces and perform complex factory-scheduling chores—challenges that have beset the computer industry for decades—are possible because of these advances.

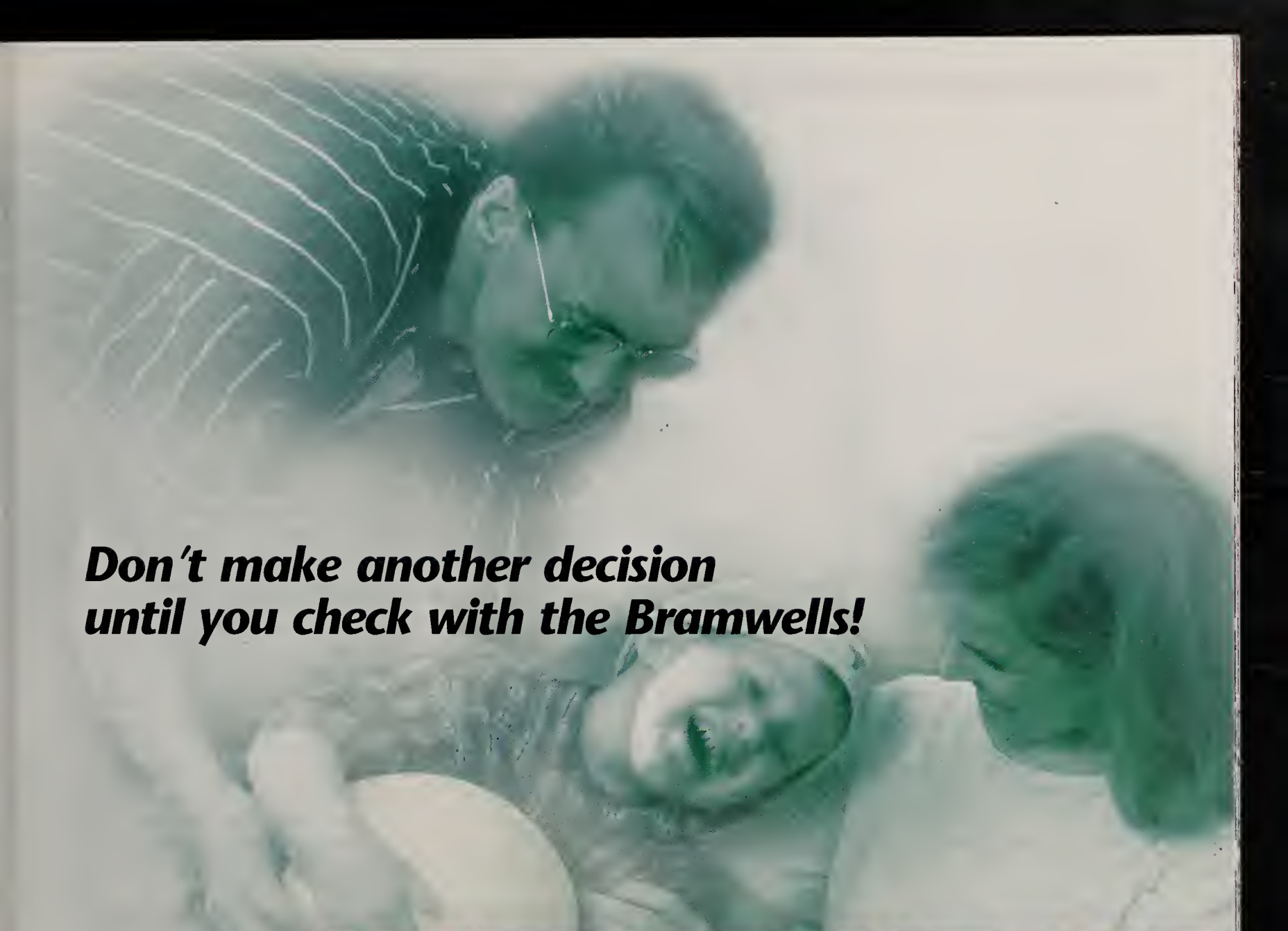
Also, as the power of the desktop continues to increase—along with the amount of data corporations need to analyze and understand—neural network-based statistical programs have gradually, and often quietly, achieved legitimacy in more mundane corporate management applications. In fact, the CFO is often the first person in a company to explore neural nets to solve a business problem. "We never had to sell our technology to Florida Hospital, because the CFO of the Adventist Sunbelt Corp., which owns the hospital, had been using neural nets to manage his money," says Epstein. Little surprise,

then, that financial applications are where neural networks have really caught on. Typically investing up to \$3 million a year, almost every large financial business in Europe and the United States is experimenting with these tools, according to Intertek Group, a Paris-based research organization that has studied advanced computational methods at 80 international banks.

Using neural networks to catch credit card fraud has been particularly popular. HNC Software Inc. in San Diego has been a leader in selling neural network tools to banks for this purpose as well as loan application review and profitability analysis. "When a credit card is swiped through the card reader in a store, most likely that transaction is being fed back to a neu-

"Compared with a human brain that has 100 billion neurons and 100 trillion connections between them...a PC is the equivalent of a housefly."

—Every Manager's Guide to Information Technology, by Peter G. W. Keen (Harvard Business School Press, 1995)



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ral net system," says Patsy Campbell, director of marketing for HNC. By analyzing the type of transaction, amount spent, time of day and other data, the HNC model makes a fraud prediction in 45 seconds and either denies the transaction or feeds the predictive score to a human analyst sitting at a workstation, who makes the final decision.

Neural network technology has saved member companies of MasterCard more than \$50 million. "We know that MasterCard member firms who use these models have lower incidents of fraud than those that don't," says Joel Lisker, senior vice president for security and risk management at MasterCard in Purchase, N.Y. So MasterCard is working with researchers at Los Alamos National Laboratory to use neural networks and a host of other advanced computational methods like fuzzy logic and genetic algorithms to build an even more advanced model that will predict the fraud potential

at the merchant level. "All the neural network activity so far deals with data the card issuer has about the customer," says Lisker. "But the issuer doesn't have the risk analysis at the merchant level in real-time."

Thanks to the partnership with Los Alamos, the cost of developing the new fraud model was less than \$1 million, which Lisker calls "the bargain of the century." The technical expertise at Los Alamos was another factor in MasterCard's decision. The lab has been developing biologically based modeling techniques for the U.S. Department of Energy to detect signs of nuclear weapons proliferation, find anomalies for satellite image processing and search an archival database that contains large volumes of data from all of the 1,054 announced U.S. nuclear weapons tests.

Unlike now-common fraud detection applications, most new leading-edge financial strategies using neural networks remain under wraps,

particularly on Wall Street and in multinational finance departments. In a perhaps mundane example, HNC Software built a neural network model to predict success rates for direct-mail marketing at banks. The \$48,000 system has been hugely successful for individual banks, but getting the word out to prospective users has not been easy. "We had one bank that reduced its mailing costs by 50 percent, increased its response rate by 50 percent and increased actual sales as a result by 18 percent," says HNC's Campbell. "Of course, we immediately thought this would be a great case study to publicize." But the bank's officials declined to allow HNC to publish their story. "They didn't want other banks in their region to find out about the software," says Campbell.

Meanwhile, neural network statistical models have begun to invade the corporate forecasting function, although, once again, most companies are reluctant to share their successes.

Words of Wisdom

Expert Systems are one example of AI-based technology. They are highly structured, rule-based computer programs that attempt to re-create the knowledge of human experts to perform a particular function, such as picking stocks or diagnosing a disease. Expert systems are built by knowledge engineers, who first identify the heuristics, or unspoken logic, behind why a human expert does a task in a particular way; those heuristics then form the rules by which the system operates. Intelligent help desks used by companies like Nintendo of America Inc., Compaq Computer Corp. and Color Tile & Carpet Inc. all depend on expert systems.

Fuzzy Logic is a form of logic that allows for the partial membership of sets. Instead of viewing everything as black and white, it allows for the existence of shades of gray. For example, instead of describing monetary policy merely as three discrete variables ("tighten," "loosen" or "neutral"), a fuzzy logic system can assign a range of intermediate values. That makes the system far more sensitive to changing circumstances and less prone to sudden swings in its conclusions.

Neural Networks, otherwise known as neurocomputers or connectionist computers, are an example of AI-based systems. While traditional architectures follow the von Neumann design, which includes memory to store

instructions and data and a CPU to carry out the instructions, neural nets use an architecture similar to the design of the human brain. In neural networks, no knowledge engineer is required, just speed and lots of data. Neural network programs may run on traditional or massively parallel distributed computers and "learn" from examples rather than following explicit programmed rules. Statistical packages touted as neural networks are programs that run nonlinear models, processing lots of data to look for patterns and relationships.

Hybrid Systems incorporate the functionality of expert systems and the flexibility of neural nets and other biological computer models to accomplish a task. These systems can incorporate the best of both worlds: neural nets' ability to recognize patterns and expert systems' decision-making capabilities.

Genetic Algorithms, or evolutionary computing models, employ survival-of-the-fittest methods to evolve an algorithm to address a problem or to "breed" a software solution. Large-scale applications that involve poorly structured problem sets or require global search on a massive scale can be best addressed by the recombination (mixing and matching) processes of genetic algorithms.

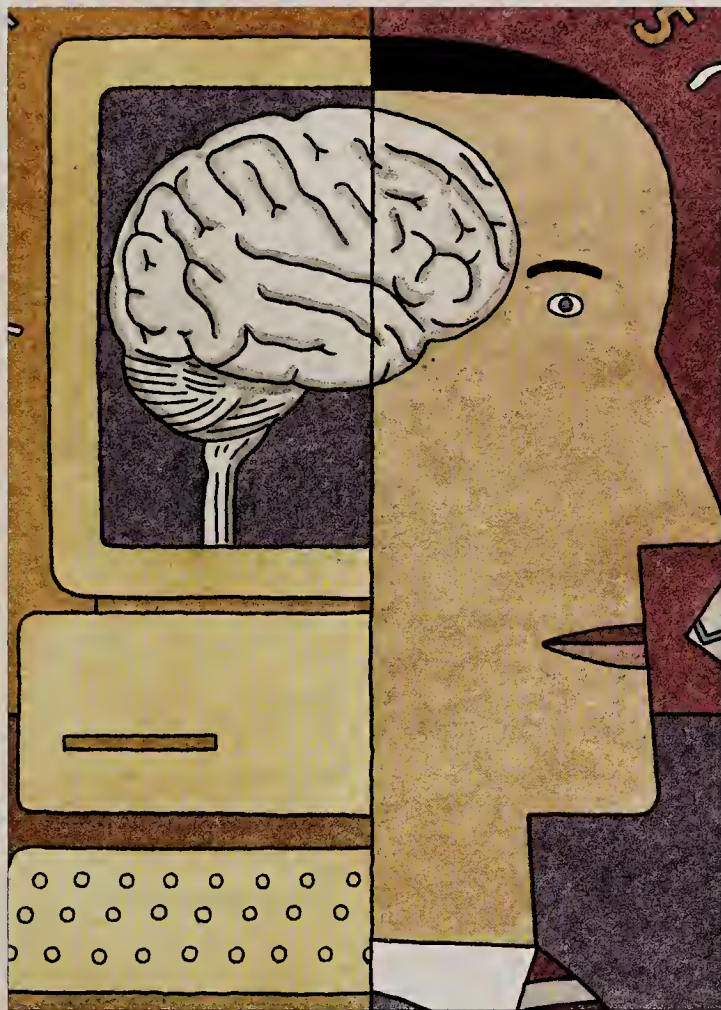
—E.B. Baatz

Kay-Bee Toys, however, is an exception. "I wasn't afraid that the software was doing any voodoo magic," says Scott Rogers, Kay-Bee's director of market research. "The gyrations that the software goes through to pull the data apart seemed much like the old statistical packages I was using." But when faced with a project to analyze store performance based on reams of data—everything from store ZIP codes to mall-vacancy rates to shelf heights—the neural network software did the job quickly and found at least one surprise in the product line that traditional methods had not picked up on.

"We found, of course, that sales by product line generally did better the farther away Toys 'R' Us was from the Kay-Bee store," says Rogers. But there was one exception: a product line that actually did better the closer the competition was. Kay-Bee had also hired consultants to do the analysis using traditional statistical packages, and, once they knew to look for it, they confirmed the anomaly. Trusting the results, Rogers went back and discovered that the particular product line under study was one that Toys 'R' Us did not carry.

UNLIKE MUCH-ballyhooed developments in such areas as object-oriented computing and client/server systems, the programs used by the likes of Kay-Bee and Florida Hospital are a radical departure from structured computer code. In fact, the architecture that underlies neural networks is antithetical to the entire traditional von Neumann architecture of the modern personal computer, which includes separate components for data processing and storage.

"Neural networks are not binary, are not stable and are not syn-



chronous. In other words, they are nonlinear, adaptive and asynchronous," says Jeannette Lawrence, the Nevada City, Calif.-based author of *Introduction to Neural Networks* (California Scientific Software, 1994). So no wonder people raised on traditional computers have trouble comprehending the concept. "Anyone educated before 1980 has problems," says Med-AI's Epstein. With many neural net-based software programs now being written to run on regular PCs, many information systems executives may not recognize the drastic changes taking place under their very noses. "Most CIOs come up through the IS ranks and are not mathematical, so neural networks are intimidating," says Whittman-Hart's Tipton. "Putting one's future in the hands of a computational model can be scary."

Indeed, neural networks, like many complicated technologies, are beset by the "black box" syndrome. That is, like a human doctor's often intuitive, sometimes mysterious diagnosis process, neural networks arrive at conclusions based on induc-

tive analysis without leaving any clear path to follow to understand why. That's why the union leaders of Chicago's police force, for example, objected to the department's use of a neural net system to pick out which cops might need counseling.

In fact, the black box problem combined with the blackened reputation that AI acquired in the 1980s has kept some software developers from labeling their systems as neural in nature at all. "There are a lot of products that use these techniques, but the vendors don't tell you," says John Parkinson, director of new technology for Ernst & Young LLP in Irving, Texas.

"There is nothing mystical about neural networks," maintains Richard Hoptroff, a physicist turned software

developer who created business forecasting software based on neural network technology for his London-based company, Right Information Systems Inc. "Neural nets are simply mathematical modeling tools that find patterns in data." So, says Hoptroff, he prefers to call his 4Thought software a math modeling tool, not a neural network.

This potential stigma can make implementing neural networks a challenge. And while few face union ridicule like that at the Chicago Police Department, selling the systems isn't easy. Nevertheless, for companies willing to explore the technology, the payoffs can be big. Says Tipton, "Neural networks can determine relationships between things you didn't even know existed and will reveal hidden truths about your business." **CIO**

E.B. Baatz can be reached at ebaatz@cio.com. For more information about neural networks, including reviews of some of the most approachable books on the topic, please see the CIO Web site at <http://www.cio.com>.

ACQUIRING MINDS

A roundtable of IS and procurement experts looks at the changing environment for IT purchasing and its effect on the CIO role

BY MICKEY WILLIAMSON

No one can doubt that the CIO's role in procuring information technology and services is more complex than it was a few years ago. It's a trend that experts expect will continue in years to come. Contract provisions proliferate. Corporate software standards erode as increasingly aggressive vendors set prices within departmental managers' discretionary spending range. Globally, cultural considerations and the quality of vendor service and support may make the imposition of preferred-vendor programs problematic.

In seeking to provide internal customers with the expertise only the IS organization can offer, CIOs must become part diplomat, part psychologist. Checking vendor references with competitors, sharing risk with suppliers and providing economic incentives for compliance with standards are among the ways in which CIOs are meeting the new challenges.

To explore these issues, *CIO* assembled a panel of experts for a teleconference to discuss technology procurement and how



CHUCK SOUTHWORTH:
*More than ever before,
technology assessment needs to
be a collaborative affair.*



they approach it. Present at the virtual roundtable were Claude Marais, director of processing services and planning in information services at Elf Atochem North America in Philadelphia; Bart Perkins, formerly vice president and chief information officer at Dole Food Co. in Westlake Village, Calif.; Glenn Gow, managing director of Crimson Consulting Group in Menlo Park, Calif.; and Chuck Southworth, senior vice president of information services and director of MIS at Ketchum Communications in Pittsburgh.

CIO: *When you've gone to the trouble of asking competitors about a vendor's capabilities, you must be looking into the possibility of establishing a long-term relationship with that vendor. What do you seek in such a relationship?*

BART PERKINS: When I was first at Dole, software was purchased on a division-by-division basis. One of the first things I did was to establish a preferred-vendor program. My objective was to drive down costs while increasing service. I believed that if I could purchase soft-

“Do you want to put all your eggs in one basket or spread them around in order to create a negotiating position two or three years down the road? If you lose that perspective as you standardize, you risk being hurt later.” —Claude Marais

CIO: *It's safe to say that the CIO's role in technology procurement is changing as quickly as the technology he or she manages. What specific changes do you see taking place and how do you, as a CIO, address them?*

CLAUDE MARAIS: The entire IS function itself is changing. CIOs are moving away from being developers and implementers of systems to becoming the identifiers and acquirers of technology. In this environment, they must train IS directors, managers and senior analysts to be far more businesslike in the way they deal with suppliers than they have in the past.

Also, an increasingly complex set of skills is required for IT procurement. Two years ago, 20 to 25 elements had to be included in the software contract. Today, we are looking at between 80 and 90 different elements.

Finally, technology procurement is being benchmarked from the perspective of the performance of the IS organization and the performance of the vendors. CIOs track their organizations' performance in comparison with other IS organizations and their vendors' performance in relation to the performance of vendors serving their competitors.

CIO: *How far can you take the notion of comparing notes with other companies about procurement practices?*

CHUCK SOUTHWORTH: I've found it possible to speak openly with many CIOs about their opinions of the vendors that we are assessing. We've begun to build a network of people who will talk about their experiences with vendors. This is particularly useful when we're assessing the level of a particular skill in a certain geographic region, which is hard to do on an international basis without having input from a variety of people.

ware centrally—or at least arrange the contract centrally—then I could probably get a better rate from many of the vendors. In fact, that turned out to be true.

Most of the regions automatically fell into line. In cases where people didn't comply, I would simply go to their bosses and say, “I can buy this product for \$48. Why are you paying \$65 for a competing product?” Dole now has one suite of office products. When I was first there, it had just about one of everything.

Its preferred-vendor program has not only saved the company a significant amount of money, but it has also resulted in increased service from its preferred vendors. Dole has cut the number of vendors rather dramatically and anticipates continuing to do so. It's able to give more business to its remaining vendors and sees them as true business partners.

MARAI: I am sometimes concerned that we may go too far in standardizing with a single vendor, which makes it very hard to negotiate with that vendor because you have very little leverage. Do you want to put all your eggs in one basket or spread them around in order to create a negotiating position two or three years down the road? If you lose that perspective as you standardize, you risk being hurt later.

SOUTHWORTH: A preferred-vendor contract is not a lifetime contract. Some vendors will move resources or even change the way they negotiate, depending on how much of an opportunity they perceive they have. If they think that they're entrenched, they'll behave accordingly. As a result, we evaluate them continuously.

PERKINS: One trend that I see—especially in global organizations—is something I call a loose/tight acquisition

strategy. In that approach to procurement, vendor relationships and contracts are established and maintained centrally, but the actual acquisition process occurs in the field with reports back to corporate on a periodic basis, just to make sure that the local unit is getting everything called for under the contract.

CIO: *The old model of the CIO—someone who imposes standards and punishes those who don't adhere to them—seems to be a thing of the past. Yet, with the increasing complexity of network and application systems, standards have never been more important. How do you go about establishing standards without making enemies all over the enterprise?*

GLENN GOW: I believe that today's CIO has to be an astute diplomat. The CIO has two masters to serve as he or she tries to balance diverse—and sometimes mutually exclusive—demands. It's becoming more difficult to satisfy the requirements of individual divisions or departments as companies go global. At the same time, the corporation as a whole may have an entirely different set of needs. I don't know how CIOs can avoid ill will in some parts of the organization at times.

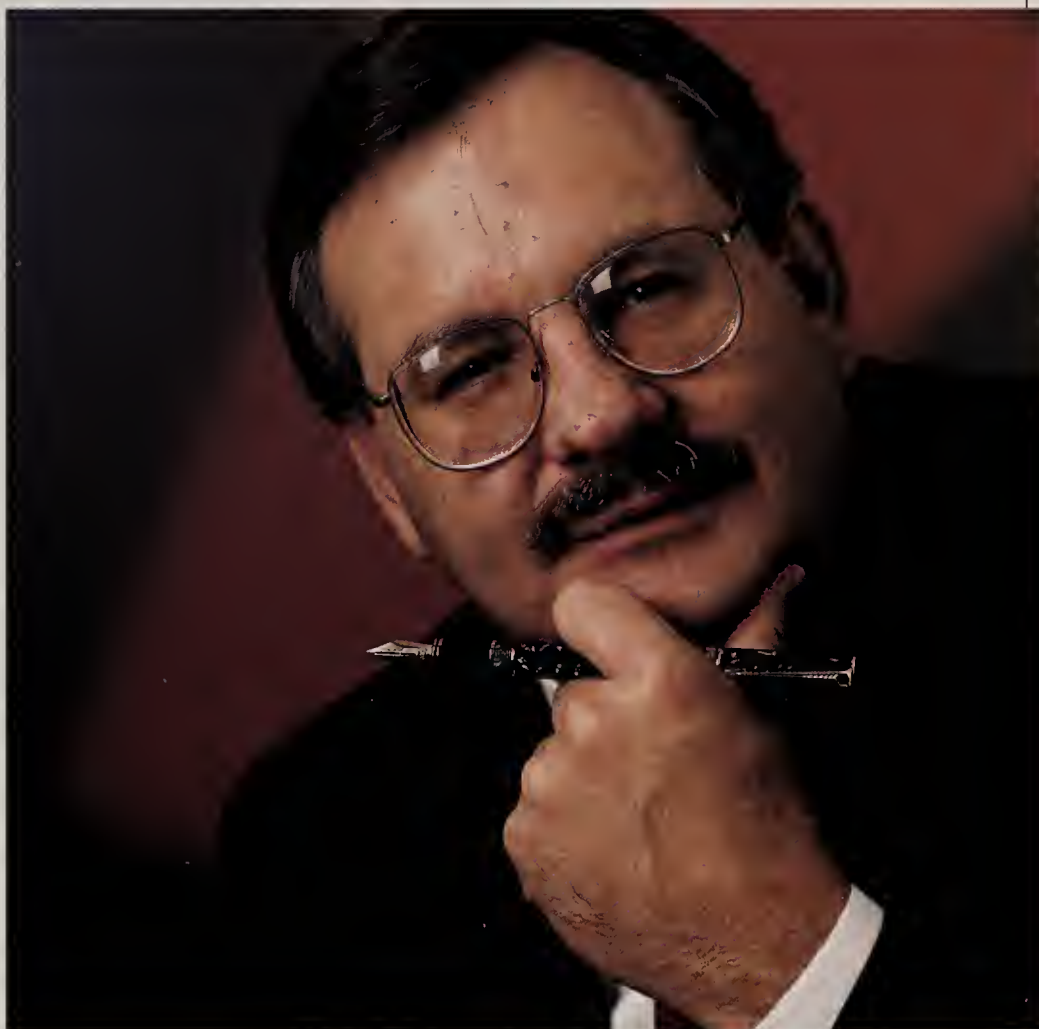
SOUTHWORTH: It is more a matter of psychology than technology. The CIO's role has become one of figuring out how to influence people, as opposed to directing them by fiat. The strategic business units have their own issues to meet in order to grow the business. A lot of time has to be spent talking with people about where their business is going and how they see it changing. The CIO must convince them to become involved in making technology decisions.

More than ever before, technology assessments need to be a collaborative affair. Formerly, IS and CIOs were able to conduct most evaluations and procurements by themselves. Today, we look for much more involvement on the part of our internal customers. We have created a regional MIS council consisting of the top MIS person from each region to establish standards. Their way of encouraging compliance is not through coercion but through economic incentives.

MARAIS: At Elf Atochem North America, IS is highly centralized. Only IS buys technology. The user cannot individually go out and buy it, any more than we can sign a contract without sending it to the legal department.

But we never define standards in a vacuum. We may not involve everybody, but we always have one or more of our user groups involved in defining the standards.

PERKINS: Dole is extremely decentralized. My challenge is to work with and educate both MIS and the business community about the cost of technology so that they will see that it is a lot cheaper to buy the products we recommend through the corporate program.



CLAUDE MARAIS: *We may not involve everybody, but we never define standards in a vacuum.*

CIO: *What are your limitations in spreading standards throughout the enterprise, and why do they exist?*

PERKINS: We've had to recognize some of the realities of working in so many different countries. For example, one of our hardware standards is available in Latin America, but you can't get service for it. Therefore, it doesn't make sense to buy it for use there. Certain brands of PCs are not available in Asia, and certain software is not available in other parts of the world. So we establish standards and then grant local exceptions where it makes sense.

CIO: *But what you're saying seems to fly in the face of the conventional wisdom that people don't want to give up their turf and their business relationships to adopt the standard.*

PERKINS: There are still people out there who say, "I'm not going to migrate from my particular piece of software." But those battles are usually down at a local level and they're quite unusual. Most of the people want to do the right thing, and they're just glad to have some guidance and direction and some economic help.

CIO: *As contract negotiations become more complex, the need for rapid response to a changing business climate is becoming more pressing. How has your procurement process been affected?*

MARAIS: We have found that we can cut the lead time for acquisitions by 50 to 75 percent by involving the procurement group much earlier in the process. In some cases, we reverse the whole process and start negotiating the contract, either simultaneously with the RFP or before it. We use negotiations as a discovery tool—especially when we are acquiring services such as outsourcing—to define what the true needs are and how the users and the IS people will manage the contractual relationship.

CIO: *Aside from being more complex, do you see other changes in the process of contract negotiation?*

PERKINS: One change I see is a shift in focus from price to value; that is, emphasizing service over price. We're asking our vendors to provide more service, and as a trade-off, we won't push for their rock-bottom price.

MARAIS: We did research with the School of Information Studies at Syracuse University on information technology procurement and asked companies: "Do you seek price concessions more than you seek price reductions?" Interestingly, the majority of companies tended to lean toward seeking price concessions. But we find that the higher they rank in their performance on software contracts, the more they tend to look for the inclusion of nonprice terms in the contract. Companies that are doing well tend to look at price less than companies that are not doing well.

SOUTHWORTH: We're looking at the possibility of writing contracts for a fixed price rather than on the basis of time and materials. We feel that it's in the best interest of our organization and the people we're working with to establish a fixed time focus and a definite bottom line for the project or purchase.



GLENN GOW: *If the risk is shared, both parties will be more pleased with the results.*

GOW: I don't believe that either party should take all the risks. If the risk is shared, both parties are going to be more pleased with the results. One way to accomplish that is to either have a fixed-fee approach—or at least put a cap on the contract price—and provide periodic milestone reviews, as opposed to a more open-ended or per-diem approach.

MARAIS: We simply put the profit margins of our service providers on the line should they not meet the criteria that we establish in the contract. In other words, we will pay a good profit, but if the vendor does not meet the criteria on an ongoing basis, the penalty is basically a drop in the vendor's profit margin. We establish that with the vendor upfront for the duration of the contract.

PERKINS: We create a pool to provide incentives to the project team, both internally and externally. If they can beat the goals that are in the business case, we pass back some of those incentives to the individuals who are responsible for that success. We're trying to motivate the project team to be as creative and as hardworking as possible. It's not fair to do that for the external people only. You have to figure out a way to provide incentives for the internal people as well, so you look at them essentially as one project team.

SOUTHWORTH: We try to avoid long-term projects. While we understand that many projects can take more than nine months or so, we are working toward having very close cutoff dates that literally prohibit us from get-

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Parallel Update	First Shipped Q3 '95	Promised 1996
Parallel Delete	First Shipped Q3 '95	Promised 1996
Stand-by Database	First Shipped Q4 '93	Promised Q1 '96
Data Skip	First Shipped Q1 '94	Not yet promised
Relational OLAP	First Shipped Q4 '95	Proprietary OLAP

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ting sucked into a runaway project. When we have one of those larger projects, we have a "cutoff meeting" once a month, where we are prepared to cut the legs off any major project. It helps to keep the team focused and gives them the incentive to get the work done in a reasonable time frame.

CIO: *How is the role of the vendor changing in the technology acquisition process?*

GOW: One of the trends I see is that software companies are driving for market share very early in the adoption of a new technology. Their initial focus is on satisfying user demand and only going up the management chain when they are forced to. I believe this trend will only grow and that it will make life more difficult for CIOs.

Another related trend is that vendors are giving away

where certain departments believe that their own choice is right for them. They can continue to be mavericks and succeed with what they're trying to accomplish, even with the higher costs involved.

SOUTHWORTH: Many IT decisions are being driven away from the CIO's role to where I think they belong: at the client-user side. In my experience, many of the goods and service providers are coming up through parts of the business other than the traditional IS group. Our internal customers can often be swayed by sales and promotional pitches about how the vendor can solve a unique problem without understanding what the overall enterprise is trying to accomplish. One of the keys is participating in and not trying to resist the decision-making process.

I think we need to acknowledge that the acquisition of

"Some software vendors believe that all they need is to get on your preferred-vendor list and that follow-up is not going to be important. Those companies, in particular, need an education." —Glenn Gow

software in order to encourage adoption. Internet client software such as Netscape and Eudora is an example of that, but it's not the only one. Several things are driving that change. Software distribution costs on the Internet are virtually nil. Second is the lowering of prices for software and hardware to the point where purchase decisions can be made at a lower level. Third is the desire of the user community, and not only the vendors, to find any way they can around an edict from senior management. And fourth, as Microsoft has shown, vendors can now get away with bundling.

Fighting these trends can be a losing battle. Learning to adapt to them will allow CIOs to manage the process. CIOs can still set corporate standards, and they should as long as they do so in concert with their users and senior management. They should also be willing to change standards as users change the requirements.

CIO: *How can a CIO deal with noncompliance?*

GOW: Since there will always be a minority of users who don't like the corporate standards and will never comply, the CIO's role is to make those users understand the cost of not complying. For example, certain information has to be accessible to the organization as a whole. So any division or department that doesn't want to use the technology chosen as the standard should have to pay the difference to make that information accessible. In addition, they should pay for a third party to support the nonstandard solution. This may not be a bad approach

technology is more collaborative than it's ever been. If you're someone who has turf to protect, then you'll most likely be left out of the acquisition process, which I think is bad for the enterprise as a whole.

GOW: I'm quite impressed with the approaches that each of you has discussed in working with your various vendors. The thing that strikes me, looking from the vendor side, is that many of these vendors need education in the way you like to do business. I believe that it's up to each organization to show each vendor very clearly where they're setting the bar for participation. Some software vendors believe that all they need is to get on your preferred-vendor list and that follow-up is not going to be important. Those companies, in particular, need an education.

PERKINS: The point of a preferred-vendor program is to give enough business to a smaller number of vendors to make us important to them, and then they'll be important to us. I don't think I should have to spend the time to really educate the vendors. That's part of the selection criteria. Do they get it the first time I talk about having a preferred-vendor program, a mix of price and service? If they don't get it and don't respond pretty quickly, then we go on to the next guy. 

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– Ralph Waldo Emerson

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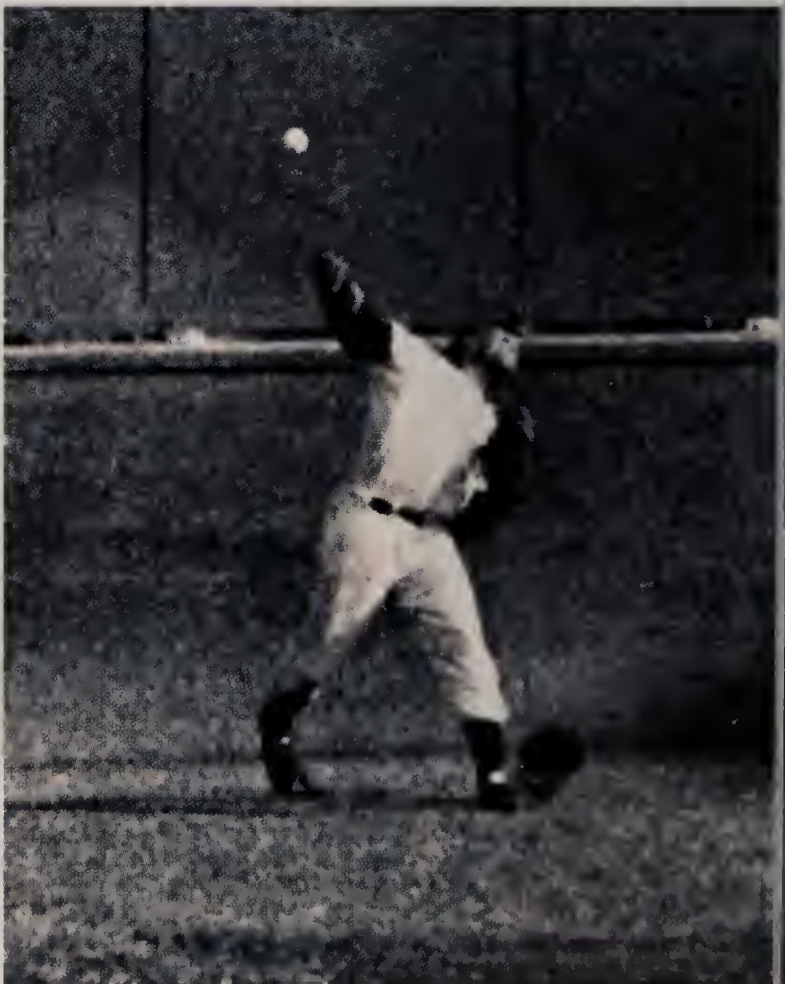
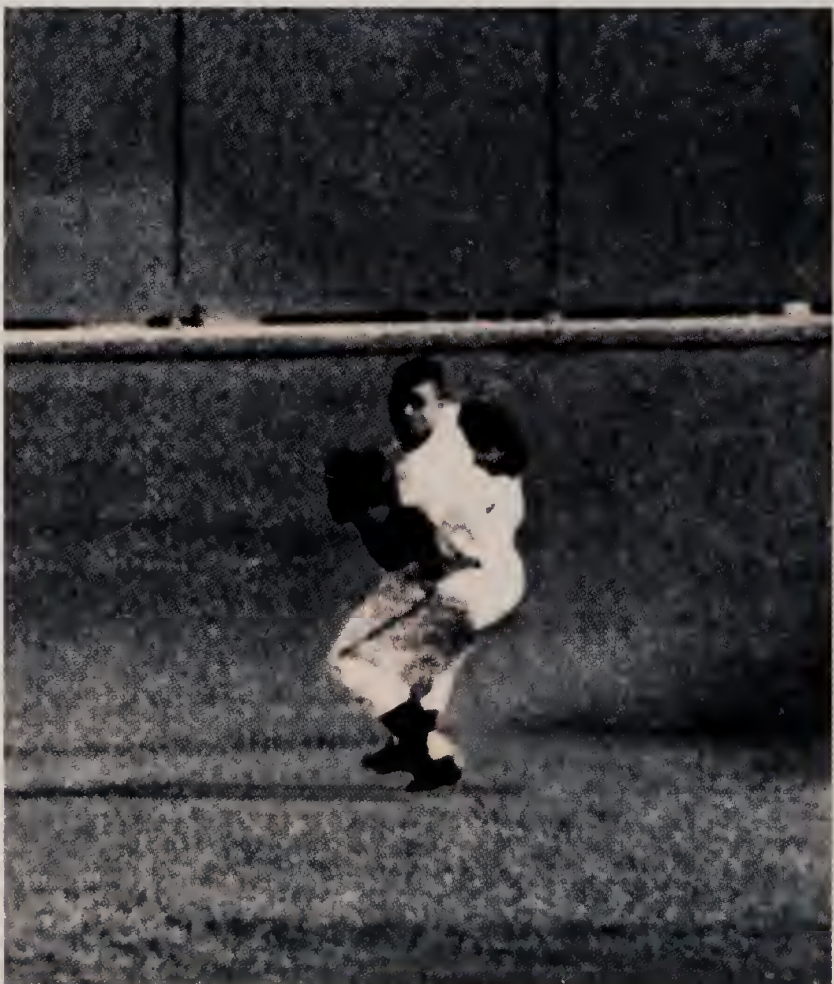
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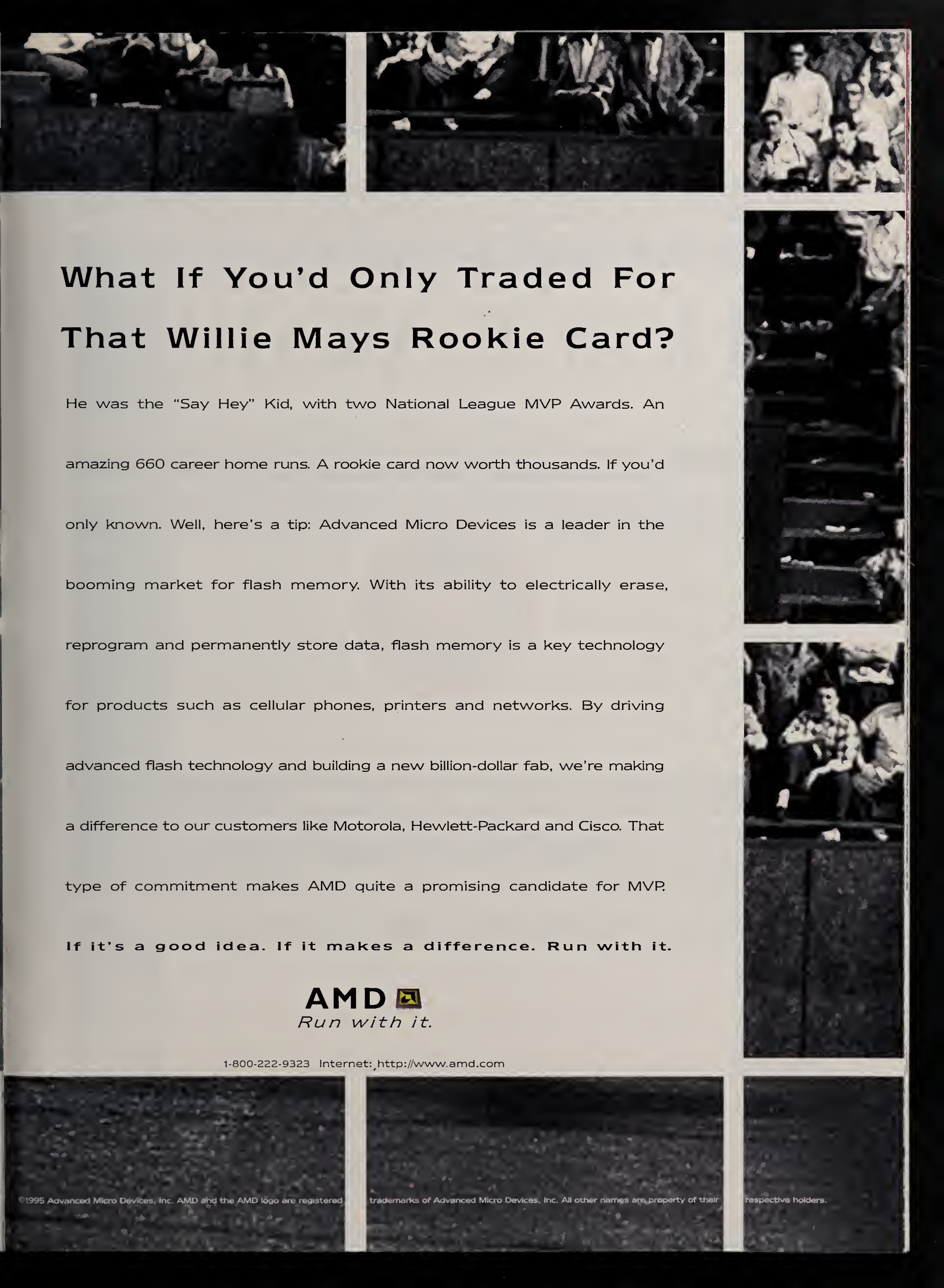
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CIO MAGAZINE'S

1995 READERS' CHOICE AWARDS

What are you buying? Our research group surveyed readers and came up with a list of leading technology vendors and products in six software and hardware categories.

CIO magazine's third annual Readers' Choice Awards survey set out to learn which particular brands of technology you've been spending your money on. Not surprisingly, our survey turned up rosters of household names.

Last summer, IDG Research Services (a sister company of CIO Communications) polled random cuts of the CIO subscriber list to find out which vendors our readers put at the head of the class in each of six technology categories: PC/workstation hardware, Internet products and ser-



vices, Macintosh software, OS/2-based software, Windows-based software and Unix-based software.

For each of the six technology categories, respondents were asked to associate particular brand names with relevant positive performance attributes. In each category, 1,500 surveys were mailed. Response rates ranged from 25.4 percent (for Unix users) on the low end to 36 percent (for Windows users) on the high end. In the following pages, we present the tabulations in six charts. Here, then, is what you're buying:

PC/Workstation Award Winners

	Brand Awareness	Consider for Purchase	Best Price/Performance	Leadership in Technology	Best Return on Investment	Best Quality	Best Service and Support
486 Desktop PCs	TIE: Compaq & IBM	Compaq	Dell Computer	Compaq	Compaq	Compaq	TIE: Compaq & IBM
Pentium/Power Desktop PCs	Compaq	Compaq	TIE: Compaq & Dell Computer	Compaq	Compaq	Compaq	Compaq
Non-RISC Workstations	HP	*	HP	HP	HP	HP	HP
RISC-Sparc Workstations	Sun	Sun	Sun	Sun	Sun	Sun	Sun
RISC-MIPS Workstations	DEC	*	DEC	DEC	DEC	DEC	DEC
Other RISC Workstations	IBM	IBM	IBM	IBM	IBM	IBM	IBM
Notebook PCs	IBM	TIE: Compaq & IBM	Dell Computer	IBM	Compaq	IBM	IBM

*Respondent base too low to validate winner

Internet Products/Services Award Winners

	Brand Awareness	Consider for Purchase	Ease of Use	Best Service and Support	Best Features	Most Innovative Company/Product	Preferred Business Partner
Web Browsers	Netscape	Netscape	Netscape	Netscape	Netscape	Netscape	Netscape
Internet Access/Service Provider	CompuServe	CompuServe	America Online	TIE: America Online & CompuServe	TIE: America Online & CompuServe	America Online	America Online
Firewalls	Cisco Systems Cisco 2514	*	Cisco Systems Cisco 2514	Cisco Systems Cisco 2514	Cisco Systems Cisco 2514	Cisco Systems Cisco 2514	Cisco Systems Cisco 2514

Macintosh-Platform Award Winners

	Brand Awareness	Consider for Purchase	Ease of Use	Best Service and Support	Best Features	Best Documentation	Preferred Business Partner
DBMS	MS** FoxPro	Oracle	Claris FileMaker Pro	Oracle	Oracle	Oracle	MS FoxPro
Spreadsheet	MS Excel	MS Excel	MS Excel	MS Excel	MS Excel	MS Excel	MS Excel
Word Processing	MS Word	MS Word	MS Word	MS Word	MS Word	MS Word	MS Word
Desktop Publishing	Adobe PageMaker	Adobe PageMaker	Adobe PageMaker	Adobe PageMaker	Adobe PageMaker	Adobe PageMaker	Adobe PageMaker
Graphics: Draw and Illustration	Adobe Illustrator	Adobe Illustrator	ClarisDraw	Adobe Illustrator	Adobe Illustrator	Adobe Illustrator	Adobe Illustrator
Presentation Graphics	MS PowerPoint	MS PowerPoint	MS PowerPoint	MS PowerPoint	MS PowerPoint	MS PowerPoint	MS PowerPoint
CASE	Powersoft PowerBuilder	Powersoft PowerBuilder	Powersoft PowerBuilder	Powersoft PowerBuilder	Powersoft PowerBuilder	Powersoft PowerBuilder	Powersoft PowerBuilder

OS/2-Platform Award Winners

	Brand Awareness	Consider for Purchase	Ease of Use	Best Service and Support	Best Features	Best Documentation	Preferred Business Partner
DBMS	IBM DB2/2	Oracle 7+	Borland Paradox	TIE: IBM DB2/2 Oracle 7	Oracle 7	Oracle 7	TIE: IBM DB2/2 & Oracle 7
Spreadsheet	Lotus 1-2-3	MS** Excel	MS Excel	MS Excel	MS Excel	MS Excel	MS Excel
Word Processing	MS Word	MS Word	MS Word	MS Word	MS Word	MS Word	MS Word
Desktop Publishing	Corel Ventura Publisher	*	Corel Ventura Publisher	Corel Ventura Publisher	Corel Ventura Publisher	Corel Ventura Publisher	Corel Ventura Publisher
Graphics	CorelDRAW!	Lotus Freelance	TIE: CorelDRAW! & Lotus Freelance	CorelDRAW!	CorelDRAW!	CorelDRAW!	Lotus Freelance
CASE	Oracle CASE	Oracle CASE	Oracle CASE	Oracle CASE	Oracle CASE	Oracle CASE	Oracle CASE

*Respondent base too low to validate winner **Microsoft *Oracle 7 Workgroup Server

Windows-Platform Award Winners

	Brand Awareness	Consider for Purchase	Ease of Use	Best Service and Support	Best Features	Best Documentation	Preferred Business Partner
DBMS	MS** Access	MS Access	MS Access	MS Access	MS Access	MS Access	MS Access
Spreadsheet	MS Excel	MS Excel	MS Excel	MS Excel	MS Excel	MS Excel	MS Excel
Word Processing	MS Word	MS Word	MS Word	MS Word	MS Word	MS Word	MS Word
Desktop Publishing	Adobe PageMaker	MS Publisher	MS Publisher	MS Publisher	Adobe PageMaker	Adobe PageMaker	Adobe PageMaker
Graphics: Draw and Illustration	CorelDRAW!	CorelDRAW!	CorelDRAW!	CorelDRAW!	CorelDRAW!	CorelDRAW!	CorelDRAW!
Presentation Graphics	MS PowerPoint	MS PowerPoint	MS PowerPoint	MS PowerPoint	MS PowerPoint	MS PowerPoint	MS PowerPoint
CASE	Andersen Consulting Foundation	*	Intersolv Excelerator	TIE: Andersen Cons. & Intersolv	TIE: Andersen Cons. & Intersolv	TIE: Andersen Cons. & Intersolv	Texas Instruments Composer by IEF
Software Suites	MS Office	MS Office	MS Office	MS Office	MS Office	MS Office	MS Office

Unix-Platform Award Winners

	Brand Awareness	Consider for Purchase	Ease of Use	Best Service and Support	Best Features	Best Documentation	Preferred Business Partner
DBMS	Oracle	Oracle	Borland dBase	Oracle	Oracle	Oracle	Oracle
Spreadsheet	Lotus 1-2-3	*	Lotus 1-2-3	Lotus 1-2-3	Lotus 1-2-3	Lotus 1-2-3	Lotus 1-2-3
Word Processing	MS** Word	*	MS Word	MS Word	MS Word	MS Word	MS Word
Desktop Publishing	Adobe FrameMaker	*	FrameMaker	FrameMaker	FrameMaker	FrameMaker	FrameMaker
Graphics	CorelDRAW!	CorelDRAW!	CorelDRAW!	CorelDRAW!	CorelDRAW!	TIE: CorelDRAW! & Lotus Freelance	CorelDRAW!
CASE	Oracle CASE	Oracle Designer/2000	Oracle Designer/2000	IBM AIX CASE	TIE: Oracle CASE & Designer/2000	IBM AIX CASE	Oracle CASE
Security	Computer Assoc. CA-UNICENTER	*	Computer Assoc. CA-UNICENTER	Computer Assoc. CA-UNICENTER	Computer Assoc. CA-UNICENTER	Computer Assoc. CA-UNICENTER	Computer Assoc. CA-UNICENTER

*Respondent base too low to validate winner **Microsoft

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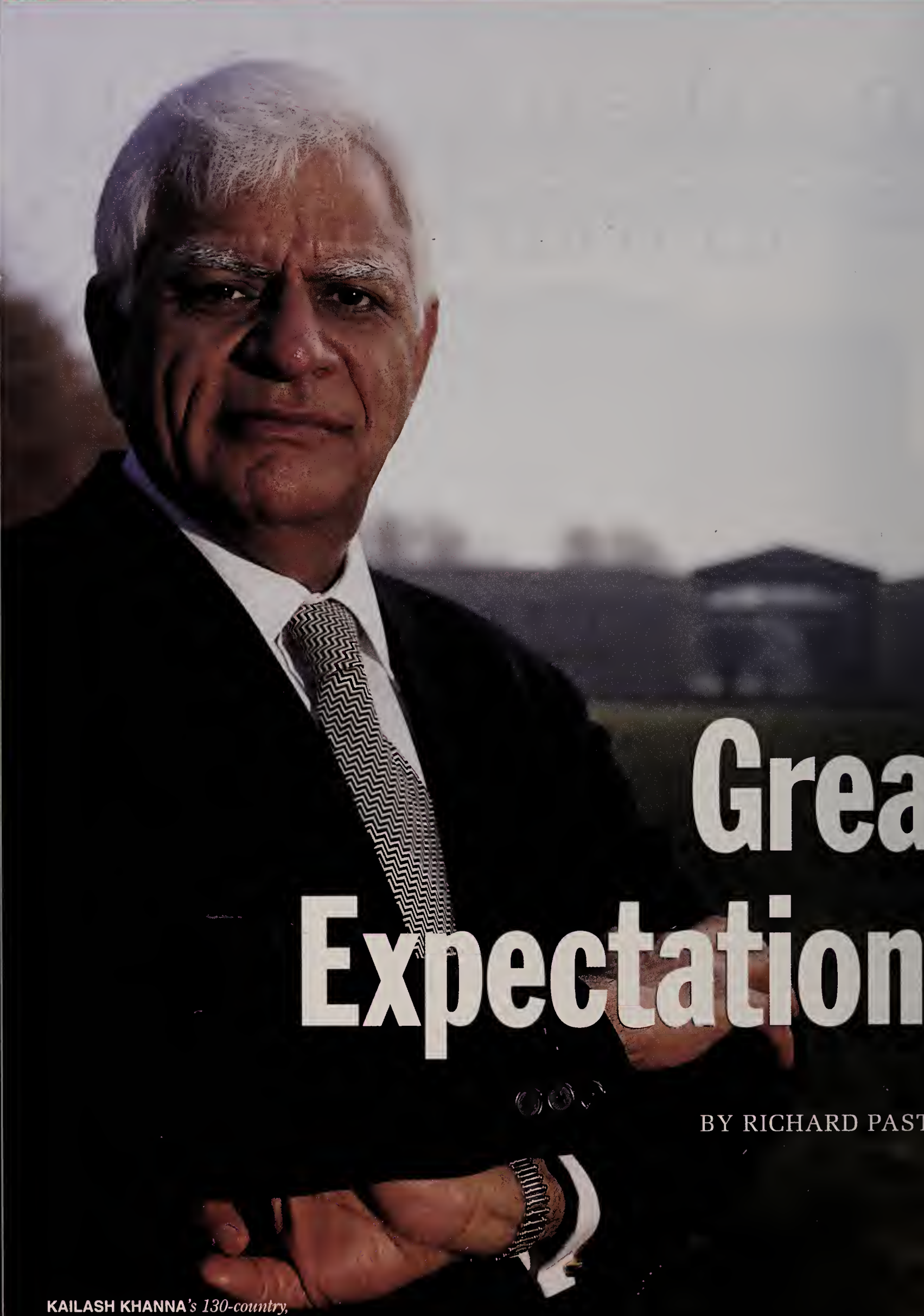
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A portrait of Kailash Khanna, a man with grey hair, wearing a dark suit, white shirt, and a patterned tie. He is looking directly at the camera with a serious expression. The background is a blurred outdoor scene with a building and trees.

Great Expectations

BY RICHARD PASTORE

KAILASH KHANNA's 130-country, 24-hour network must satisfy the low-tolerance banking community.

The Society for Worldwide Interbank Financial Telecommunication is a customer-owned organization whose charter is to whisk financial transactions around the globe—at any hour, error-free. Its customers want flawless service, but in their capacity as owners, they also have an eye on the bottom line. It's the IS dilemma in spades.

IN THE SPOTLIGHT

Society for Worldwide Interbank Financial Telecommunication (SWIFT), Brussels, Belgium

Business: Financial network messaging service provider for global banking community

Revenues: \$375 million (U.S.)

Personnel: 1,331; 877 in information technology, support and operations

Users: 5,337 financial institutions and branches

Competition: Private internal bank networks, potential rival offerings from telecommunications companies

THOUGH NEUTRAL GENEVA HOSTS ITS SHARE OF GLOBAL political organizations and gatherings, many multinational businesses gravitate toward Brussels—a sort of international trading post at the crossroads of the Continent. The Belgian capital cultivates an international image, with chic shopping boulevards reminiscent of New York's 5th Avenue, ancient city squares resembling the plazas of Paris and imposing business towers that aspire to Frankfurt. The locale seems fitting for the Society for Worldwide Interbank Financial Telecommunication (SWIFT), a 22-year-old organization whose owners hail from 130 countries and demand 24-hour-a-day, error-free information services.

SWIFT built its headquarters in a forested region of 19th century nobledom on Brussels' southern flank. The marble-columned, skylighted office park would knock the socks off anyone's clients, but for SWIFT, it's also a source of chagrin. Since the cooperative's customers are also its owners and directors, such lavish digs can raise disapproving eyebrows as well as inspire confidence.

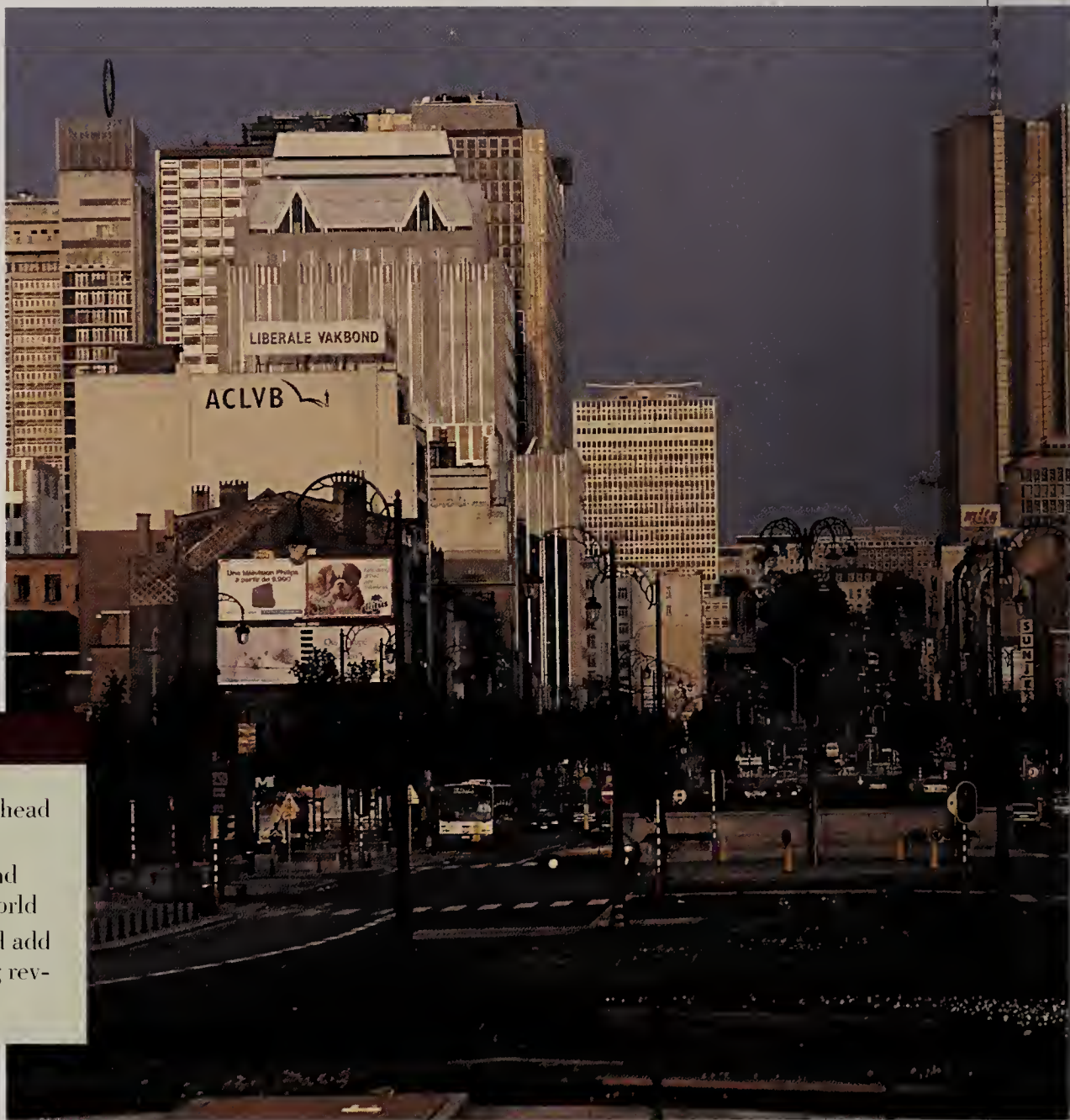
This paradox is an issue for any firm owned by its customers. For SWIFT, which provides electronic transmission of international financial transactions, it doesn't help that its owners are bankers who likely

BUSINESS CHALLENGES

- Anticipate future needs without getting ahead of conservative owners and customers
- Implement and support customer sites and installations in 130 countries around the world
- Enhance performance of core service and add services while curtailing costs and rebating revenues to customers

have the bottom line stitched on their sleeves. The organization's IS group must walk a fine line between cost control and pushing the envelope on information technology and services for its 2,795 bank owner-customers (it has an additional 2,300 non-owner customers that are primarily securities firms).

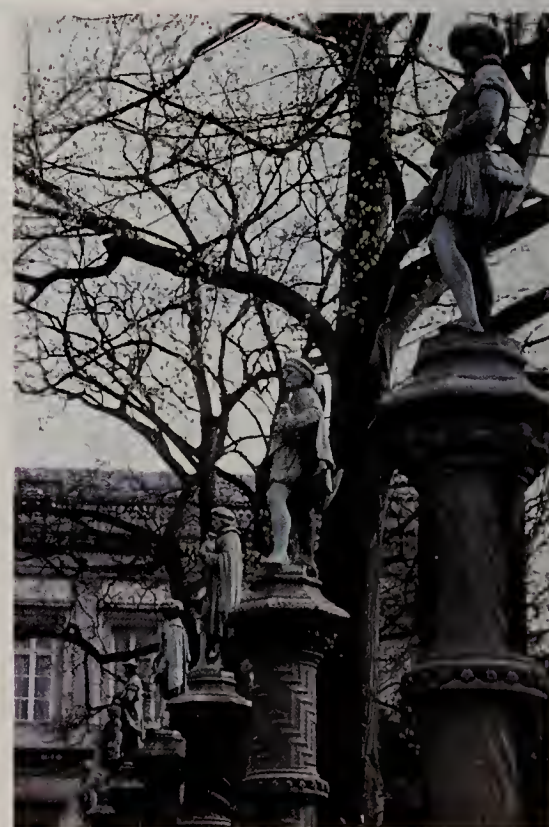
SWIFT was born when some 240 of these banks got together to create a standardized electronic method of transferring funds across borders. The previous manual and proprietary systems had proved unworkable as volume increased. With the SWIFT network, a bank in Singapore can electronically swap customer and interbank funds, clear checks, share balance information or trade securities with an institution in New York. Today the low-tolerance network transmits 2.7 million messages and over \$2 trillion in funds



The international business nexus of Brussels is a fitting location for SWIFT, a 22-year-old organization.

daily—a logistical strain if there ever was one.

For all the pressure the job might entail, it's not surprising that SWIFT's head of technology, operations and support sports a crop of shockingly silver hair. But Kailash C. Khanna's subliminally soft voice be-



speaks a calm demeanor that has served the transplanted American well since he joined as IS chief in 1993 (SWIFT recently added operations and support oversight to his IS



I.S. STRATEGIES

- Streamline network recovery procedures to improve customer service
- Eliminate functional barriers within IT, support and operations organization to present a seamless interface and uniform service to customers
- Build on core competencies that facilitate global network management and support

count its fees; it returned \$27 million of its \$375 million (U.S.) revenues to its owner-customers in 1994.

SWIFT's IT approach is profoundly shaped by these conditions. "We have to be careful not to get ahead of where the banks want to be technologically, but we want to be a player in their thinking and become more of a strategic asset," says CEO Leonard Schrank. "SWIFT used to go up the mountain and come down with a plan. Now we listen to members and engineer it." For example, recently a dozen bankers met with the organization's IS people to map out a strategy for a new payments service, something that wouldn't have happened in the past.

duties). An IS veteran of American Express and the CIT Group of Manufacturers Hanover Bank, Khanna notes some significant differences in his challenges at the society. At the American companies, many of the corporate-level systems he managed ran as utilities for a captive set of users and divisions. At SWIFT, he says, "your existence depends on members being happy and satisfied, and you have to show cost justification every day." He adds that today, with the threat of outsourcing, this situation is no longer peculiar to customer-owned firms.

The other major difference for Khanna is SWIFT's relative paucity of riches. While AmEx spent \$1 billion annually on technology during his time there, SWIFT's IT budget in 1994 was \$177 million (still 56 percent of the technology-dependent firm's total operating expense). Rather than pour all its money into IT, the cooperative's policy is to rebate excess operating revenue and dis-

S strayed beyond the business objectives in 1993 when it looked into replacing its core network system—a Unisys A-series mainframe system composed of 2 million lines of code written in Algol—with a client/server system. The ill-conceived scheme didn't fully focus on possible performance gaps or risks involved. "I saw prototypes that would not have handled current volumes," Schrank recalls.

"Client/server wasn't ready in 1993," agrees Khanna, who aborted the project. The existing mainframe architecture was sound and scalable, "so I did not see any merit in redoing the application for client/server." Similarly, Khanna is not getting caught up in the rush to ATM. T-1 bandwidths are sufficient for SWIFT's average message size.

Khanna's staff instead is focusing on service gaps that might be tolerable for others' customer bases but are insufferable to the banking and

securities community. For instance, customers were dissatisfied with the 18-minute recovery time for network disconnects caused by failures in the organization's 12 regional processors. Also, every failure would expose a packet of 10 interbank messages to duplication because the integrity level was set at a unit of 10. "If the computer failed, we lost track of those 10, requiring a lot of manual labor as members re-sent the 10 messages that might have been lost and then searched the system for any duplicates," Khanna says.

By changing over to a hot computer standby and implementing faster customer connection procedures, SWIFT was able to cut integrity levels to a unit of one and shorten pro-

"SWIFT is engaged in a quality improvement process to shorten communication paths and allow for faster, cross-functional problem solving within ISO."

—Kailash Khanna



cessor recovery time from 18 minutes to four. Disaster recovery, where a whole regional site is affected, was cut from eight hours to 75 minutes by replacing the batch-oriented synchronization of the organization's two operating centers in The Netherlands and Virginia with a real-time update process. Khanna expects to trim this to a half-hour next year by maintaining the databases of the two centers in synch and by implementing parallel rather than sequential processes.

Another problem Khanna is addressing is the lack of a seamless interface for customers. Today, for the most part, customers see a function-



SWIFT's palatial headquarters can be a source of chagrin.

ally separate IT, support and operations (ISO) organization, where problems are passed on from product management to system planning to testing and so on. "We don't have a holistic set of individuals involved in any particular service," Khanna says. "They're sitting embedded in their own different functional organizations."

To create a more seamless entity, SWIFT is engaged in a quality improvement process to shorten communication paths and allow for faster, cross-functional problem solving within ISO. Regardless of which door customers use to enter SWIFT, they'll be taken care of, Khanna says. No one will hear, "I don't do this; go to somebody else." For a customer like Barclays Bank PLC, which has multiple sites connected to SWIFT across several geographic regions, a holistic ISO attitude will help ensure that all its sites get the level of service for which the company has contracted.

Working with a worldwide customer base can be a logistical nightmare for some companies; SWIFT considers it a core competency that it continually hones. Adding a branch or bank in an established country is a relatively simple matter. Without disrupting banks' existing traffic, SWIFT can add a new branch to its Northern Telecom X.25 network in three months. The process is akin to initiating new e-mail boxes. SWIFT processes the bank's personnel and address directory, examines expected traffic to

choose the most appropriate interface and works with bank telecom staff to make the connections. The total time for bringing a new customer online was shortened from 18 months by implementing the directory, interface and telecommunications components (along with the legal issues) in parallel rather than sequentially. SAP R/3 software has also helped streamline the customer-order and system-procurement part of the process.

To enter new countries, SWIFT must run a more challenging gauntlet of negotiations with PTTs, the banking community and government parties such as ministries of finance and telecommunications. A team from Khanna's network operations staff, seasoned in negotiations and relationship building, handles these assignments.

Even with an experienced team, it can take one to two years to gain the necessary permission for SWIFT to enter a country for the first time. Once the green light is given, the next stage is to establish local network access points. Contract workers set up unmanned telecom switch stations in most countries. In countries where political unrest is a factor, SWIFT opts for a network feed originating from a less volatile bordering nation.

Companies that blanch at managing an average buildingwide networked environment would be appalled at SWIFT's worldwide challenge. The Dutch and American centers monitor network traffic around the globe. A proprietary expert system diagnoses

clock by people speaking six to eight languages. While most support is handled by phone, SWIFT has located some full-time staff in hotbeds of global finance such as Wall Street. Support staff travel to install network and interface software at customer banks, though this role is now being considered for outsourcing, Khanna says. Already, in distant countries like Korea, Japan and India, SWIFT uses licensed agents. Major upgrades, reconfigurations and recovery tests are allotted to four hours of scheduled downtime on alternate weekends.

"We have to be careful not to get ahead of where the banks want to be technologically, but we want to be a player in their thinking and become more of a strategic asset."

—Leonard Schrank

Ultimately, Khanna and the ISO group's performance is measured not by the latest technology innovation but by how many messages were successfully transmitted by a bank in Monaco Monday, how long it took to get a phone line back up in Taiwan Tuesday and how much of

COMING UP

European Spotlight: Belgium's Interbrew



problems and suggests corrective action to network operators. SWIFT is introducing off-the-shelf network management packages as they become available, hoping to replace its in-house, proprietary systems and thereby reduce maintenance costs.

Support for this global user community is apportioned over three telephone centers staffed around the

the owners' money was saved in the last quarter. If these metrics live up to expectations, SWIFT's IS group will do what few others can manage—please the users, customers, board of directors and shareholders all in one fell swoop. **CIO**

Richard Pastore can be reached via e-mail at pastore@cio.com.

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Doing Equals Learning

Organizations look for ways to erase the line between training and work, helping to lower costs and increase efficiency as they go

BY TRACY MAYOR

It's been years since CIOs and other managers had the luxury of being able to ignore corporate training. Operations have become more complex, systems more mission-critical, the workforce more volatile and education more expensive. And training has emerged as an upper-level concern in most IS departments. In fact, it's the basis for a \$7.5 billion industry, according to Framingham, Mass., research firm International Data Corp. (IDC).

But even as managers shop among the list of cutting-edge training techniques—from computer-based training to multimedia movies to hypertext help—another group is working just as hard to erase training altogether.

Are they crazy? Not quite; they're the proponents of Electronic Performance Support Systems (EPSSs). At their most ambitious, performance support systems seek to wipe out the distinction between learning and doing by embedding the user's work requirements into the underlying structure and design interface. "Training and documentation are

compensatory for badly designed applications," declares Gloria Gery, the Tolland, Mass., software-design consultant credited with developing and naming EPSS. "If you design around the work process and embed knowledge into the application, far less training is necessary."

The interface and structure of an EPSS program, together with built-in aids such as tip boxes, voice-narrated demos, balloon help and hypertext links, work to answer questions before they're asked. An EPSS shows users clearly and simply how to get more information and lets them control their own access to more in-depth training when and where they need it, all without leaving their workstations.

Applying these principles to the hotel industry, for example, yields a system that presents reservation takers with a graphical depiction of the hotel floor, including clear, recognizable icons indicating instantly which rooms have king, double or single beds, which rooms offer other amenities such as mini-bars or views and which are booked on any given night. In human resources, performance-support systems, like the one offered by Phred Development Inc. in Breckenridge, Colo., help managers identify conflicts, determine their cause and develop solutions without needing to be formally trained in the psychological principles that underlie the program. In computer systems circles, an EPSS works as a just-in-time training tool that helps novices learn computers, operating systems and applications by tapping intelligent agents, task-focused computer-based training modules, audio instructions embedded in the software at key points, animation, an expert system and hypertext-linked online help.

According to IDC figures, technology-delivered training in 1995 will ac-



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count for 19 percent of the projected \$7.5 billion spent, with EPSSs taking up 7 percent of that figure. "We see it as an emerging technology," says Ellen Julian, IDC senior analyst for IT training and education research services. "EPSS needs a knowledge engine. It takes time and money to build that, but the value is phenomenal."

But orchestrating the involvement of workers from many departments (and often, the development of a completely new approach to business practices) can consume time and resources some companies feel they can't spare. While the most avid proponents argue that EPSS is an all-or-nothing science, many companies have stepped into the void between traditional computer-based training and full-blown EPSS, offering a range of solutions that organizations can use like stepping stones on the path to performance-supported enlightenment (see "Desktop Options," Page 58).

But for large or visionary companies with a need to train users on mission-critical, process-oriented systems, there often is no turning back after they see the EPSS light. "Large, decentralized and increasingly globalized companies are looking into EPSS," says Alexandra Rand, president of Internal and External Communication Inc., a custom training and performance-support consultancy in Marina del Rey, Calif. "The more heads you have, the more easily a system is cost-justified." Otherwise, early adopters can be technology companies, which Rand says are more likely to understand the benefits of a performance-centered system, and small upstarts that want to use information to get an edge over larger, entrenched competitors.

Cost-justifying even a large system can be relatively easy, Rand says. A properly designed EPSS can reduce the new-employee learning curve by making workers productive almost immediately and offset traditional costs for classroom training, tech support hotlines and print costs associated with updated documentation. In addition, it can eliminate often-hidden problems such as lost

business due to worker incompetencies, productivity disruptions caused by new systems that were introduced to workers in the wrong way, or even the legal risks associated

**EPSS shows users clearly
and simply how to get
more information and
lets them control their
own access to more
in-depth training when
and where they need it,
all without leaving
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with having poorly trained or poorly supported workers giving out incorrect information.

Does that mean every software application needs customized support? Not quite. Utilities, general-purpose desktop applications and some data-entry or data-retrieval programs don't necessarily need the power and complex programming behind a full-blown EPSS—particularly since those types of programs now include wizards, tutorials and other how-to tools.

On the other hand, says Gery, task-based applications that generate specific outcomes or cognitive conclusions—such as financial, accounting, management, human resources and manufacturing systems—are naturals for EPSS because they require two kinds of training: systems-based instruction (how to use the software) and what she calls domain learning (why one uses the system).

At the crux of Gery's theories is the concept of context break, or how far away from the user's work experience he or she must travel in order to receive assistance. "If it's more than one click away, people won't bother," Gery says. Journeying out of the of-

fice for a multiday instructor-led seminar is as far away from work context as possible; calling the help desk, rummaging around bookshelves for documentation or collaring passing co-workers are only slightly less intrusive. Popular help tools such as cue cards, wizards, process maps and tip boxes, which Gery classifies as "extrinsic" support, are much better because they reside in the software, but they still require users to shift gears from a working mode to a querying mode. "If people have to change from doing to learning, they won't do it," she says. "If they get on the help line and have to wait 45 minutes, they'll ask, 'Can I get away with changing the goal instead?'"

Intrinsic support obviates such questions by presenting an interface that provides clear direction to whatever supporting data users need. "You need to identify the things that people do 80 percent of the time and make those intuitive and easy to use," says Tim Harvey, vice president of information technology at Memphis, Tenn.-based Promus Hotel Corp., which owns the Embassy Suites, Hampton and Homewood chains. Promus's new property-management system, currently nearing the end of its first year of development and scheduled to roll out in January 1997, is being tailor-made to reduce the firm's systems-related training costs by an aggressive 80 percent.

Simplicity and clarity are paramount design goals for the system. To that end, the Microsoft Windows-based system sports a onscreen calendar—an object universally recognized by workers—that eliminates the need for a "correct" date form; users simply highlight the requested dates on-screen with a pointing device. In addition to reducing training, the calendar allows users to accommodate a wider range of customer requests ("the first weekend in June" as well as "June 6") and reduces data-entry errors. Likewise, where the existing system requires users to type the acronym NXBL for a non-smoking room with a double bed, the new system simply shows the universal no-

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Desktop Options

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you think to teach an
old dog new tricks

For the large number of trainers and IT managers not yet sold on Electronic Performance Support Systems (EPSSs), companies offer a wide range of options, some tried and true, others innovative, that help improve technology-delivered training without the business-process reengineering often required by an EPSS.

"For less than \$10,000 in hardware and software, you can capture video vignettes or use a relatively new tool like the Win 95 help engine" to enhance existing applications with built-in or linked tutorials, how-to files or other types of support, according to Mark Minasi, president of Mark Minasi and Co., an Arlington, Va., technical education firm specializing in books, magazine articles and instructor-led learning.

Other companies turn to multimedia authoring tools from companies like Macromedia Inc., which makes Authorware Professional and MacroMind Director; Asymetrix Corp., which markets Toolbook; and Aimtech Corp., which offers IconAuthor. These tools and others like them help companies add sound and graphics to existing applications or develop full-blown standalone computer-based training videos that users can run onscreen without leaving their workstations.

PTS Learning Systems in King of Prussia, Pa., has developed what it claims is a better way to train users on popular and custom desktop applications and on Windows 95. PTS's product, On-Demand Interactive Learning, loads on the network

and is accessed within the live application to provide three modes of user-controlled, context-sensitive training: demonstration mode, teacher mode and Lightning Learning mode. If users choose Lightning Learning mode, for example, the software overlays a learning box on top of the live application and performs the procedure in question, with users following behind in the live application with their own cursor. On-Demand Interactive Learning is available now for Microsoft Windows 95; modules are in development for Microsoft Office for Windows and for products from Lotus Development Corp. and Novell Inc.

Starlight Networks Inc., meanwhile, has teamed up with Sun Microsystems Inc. to offer an end-to-end bundled solution that lets companies deliver networked multimedia to users' desktops. The companies' Training on Demand system comprises Starlight's StarWorks multimedia networking software and courseware, preloaded on a Sun Sparc workstation. The result is full multimedia-enabled video-on-demand delivered to individual users' desktops with only minimal upgrades to the individual client to support multimedia. Courseware is available for a range of desktop applications, including Windows 95, Ami Pro, Excel, WordPerfect, dBASE and OS/2.

Whether organizations grow their own training from scratch, opt to expand on installed systems like Windows 95's help system, adopt a spot solution like those listed above or choose to go the whole nine yards with a complete EPSS, Minasi and other traditionalists insist that no system can replace human interaction entirely. "CBTs have been very good for simple skills-based training, but for concepts, or what I call 'lightbulb' classes, you need person-to-person interaction. But designing client/server or learning Novell networking are still person-plus-instructor topics."

—Tracy Mayor

smoking symbol and the words "double bed." For transactions, the system actually paints credit card logos onscreen, with appropriate number-entry boxes linked to each one.

Performance-support systems don't necessarily need to be written from the ground up—nor do they need to employ the latest in technological wizardry—to be effective. United Services Automobile Association (USAA), a San Antonio insurance and financial services company, has long maintained a legacy IMS system that was originally designed for accounting specialists but is now used by policy-service workers for adding or deleting policy details, checking on status of payments and policies in force, tracking billing and late fees, and other tasks.

Currently, policy reps must sift through several different screens on the legacy system to come up with that information, issuing multiple transaction codes, which they are expected to memorize. The results are long telephone calls, which are inefficient and off-putting to customers, and caused an unacceptably high number of calls referred to accounting specialists.

At the request of the users themselves, USAA undertook writing a performance-centered front end to the system that met the account rep's needs from a single screen. The pilot will be rolled out to 60 service representatives in September. In the program, when workers identify the customer, they see that customer's entire status report on a single screen, with alert buttons that call attention to special situations (late payments, service charges and so on). A single button click brings up more-detailed information on any item on the initial screen.

"We wanted an interface that aggregates data in a better way, presents in a better way so that it's more easily understood, more easily accessed," says internal systems consultant Art Howe. We developed three prototype metaphors—a calendar, a bar graph and text—and we thought something other than text would be more intuitive, but the users said text was the

simplest to use. We were surprised by that," he says.

Howe says usability testing thus far indicates the company should have little problem reaching its goals for the system—a 30 percent reduction in referred calls and a reduction in the average length of a call by 30 seconds.

If EPSS practitioners agree completely on any one topic, it's that the design process must include input from a wide variety of departments. "Traditionally, IS is measured on how well it produces bug-free, executable code; someone else is expected to take care of training somewhere down the line," Gerry says. For an EPSS to work successfully, that mind-set has to change before development even begins. "You have to reconceptualize your application and its goal, and the CIO is pivotal to this process."

Gerry ticks off a long list of people who should be involved in development, including designers, knowledge-representation experts (formerly known as trainers or documentation writers), visual artists and, as always, the people who use the current system and will be expected to use its replacement. That may sound like a full house for any single meeting room, but EPSS proponents in the field back up her assertions 100 percent.

Mike Chance, general partner with the Mantissa Group consultancy in Durham, N.C., spent several years developing a wide-ranging, multiplatform performance-support system for a global systems company. Thirty people from eight departments, organized into a team with a democratically appointed leader, were fully involved, with input from others as needed. "The low-level design on an EPSS is very critical to its success,"

Chance relates. "We learned that no decision could be made without all parties present and in agreement." The group included experts in instructional design, animation, video, online help and other support issues, but "there was no one person who understood all the pieces" as well as the group did as a whole, Chance says.

And as an absolute never-break rule, customers must be involved from the very beginning, managers say. "Even though IS has learned you can't design a good system without user involvement, in developing the EPSS, that involvement is more intensive and uniform throughout the process," says USAA's Howe. "Programmers have to think in a different way and they need users by their side helping them think." 

Tracy Mayor is a freelance writer and editor in Beverly, Mass. She can be reached at tmayor@shore.net.

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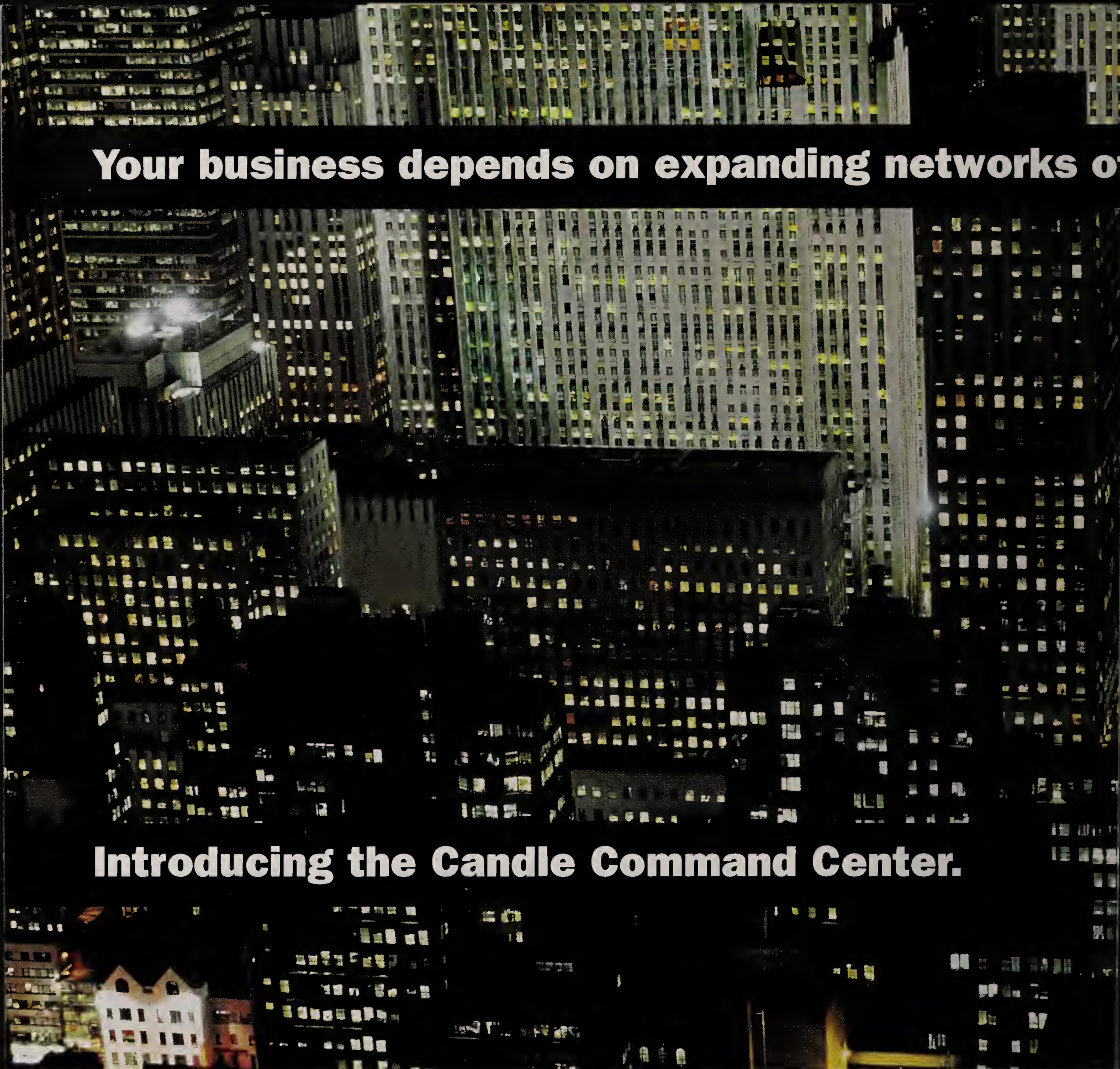
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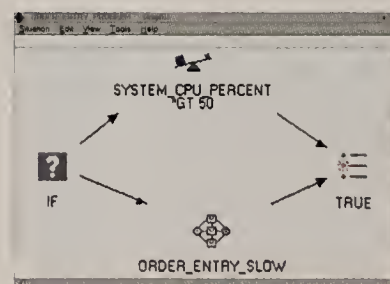
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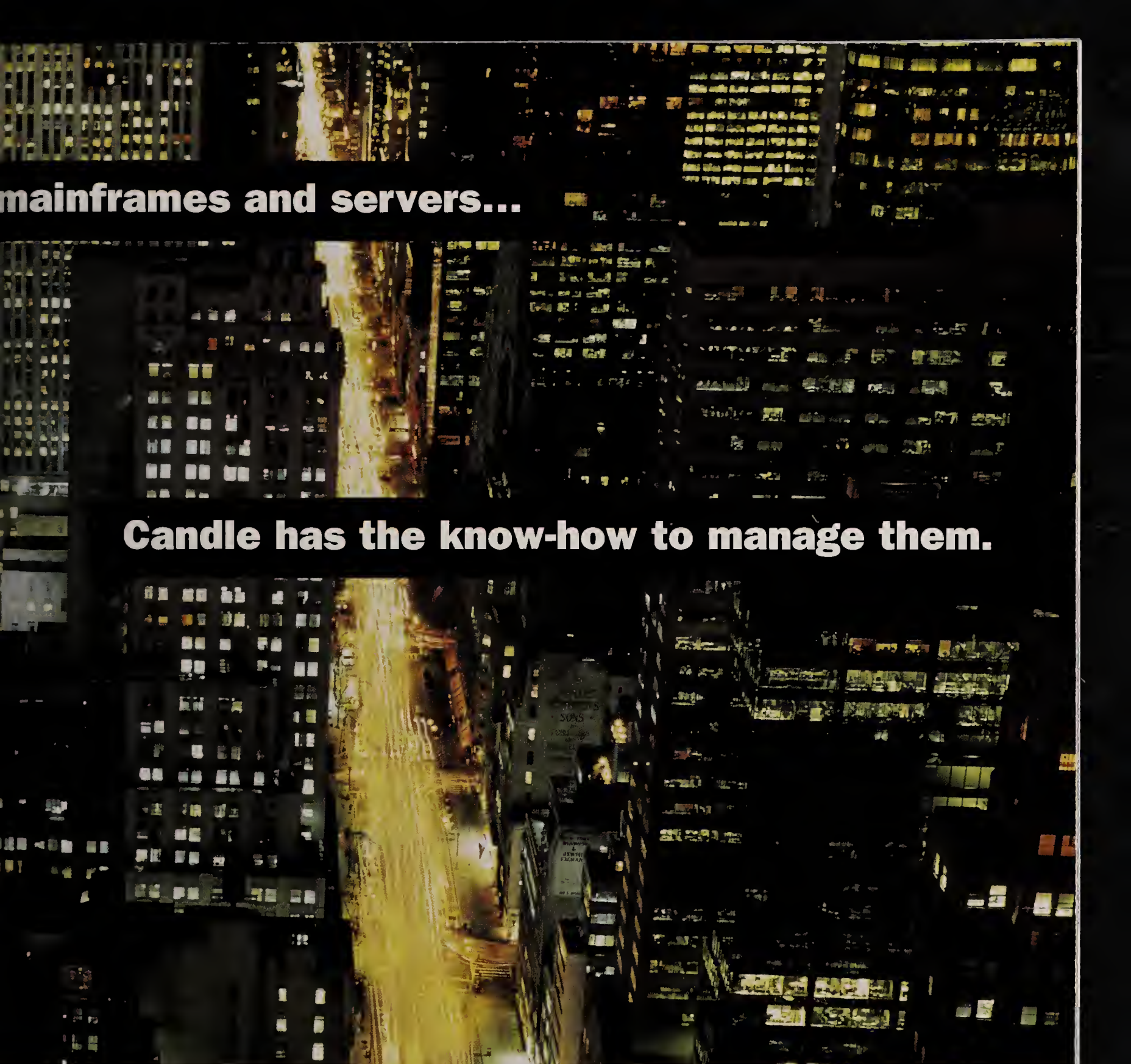
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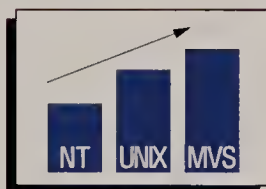
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Continued from Page 72

new ideas at all. What they wanted was job security: 'Look, boss, those consultants recommended by those other consultants and used by all the big guys told us we should do it. I mean, who are you gonna believe?'"

THORNTON MAY

VICE PRESIDENT

Cambridge Technology Partners

A methodology is not necessarily a bad thing. You do need some methodological lever or procedure, such as self-governing project teams composed of clients and consultants, to gain consensus on what needs to be done and how to do it.

However, if methodology is not linked specifically, financially and contractually to the delivery of a specific business benefit, you are screwed. A methodology is a tool. The only reason you use it is to get to that end result faster, cheaper and with less human suffering than without.

As for consultants being messengers, it happens, but I think it's gutless on the part of senior managers. They hide behind the consultant saying, "It's not us who say 80 percent of the people here have to go, it's the consultant." To me that's not a high-value use of a consultant. If what you are is a pet or an ornament, then that's not value adding. But it happens all the time, and it's why strategic consulting has such a bad name right now.

Consultants are often used as go-betweens for vendors because vendors are even lower on the credibility food chain than consultants. The content people, the real thinkers in the vendor organization, are so far removed from the client that you get this content-free sales force. I mean when your value added is lunch,

you've got some problems. I personally think that if a vendor product works and delivers order-of-magnitude benefits, the fact that you didn't look at everybody else doesn't bother me that much. As long as the client makes a ton of money on the delivered solution, that's what matters.

The efficacy with which businesses—and CIOs—manage third parties like consultants is really a telltale and critical success driver for the 1990s and beyond. Nobody is big enough or rich enough to have all the skill sets they need to be able to sustain long-term competitive advantage. The only way you can do that is to make sure you are jacked into some of the smartest people in the world. The people who use consultants effectively bring them in to stir up the waters, to be provocateurs. That's not a bad thing. You don't want to

"As for consultants being messengers, it happens, but I think it's gutless on the part of senior managers."

—Thornton May

put your career at risk by saying, "Excuse me, we have no strategy for electronic commerce," or "Gee, we don't really understand customer management." That is probably a good thing to have a consultant say because when you hold that data up, it is always good to hold it away from your body. Because senior executives go into big-time denial. But a consultant's job is to bring new ideas and

new perspectives and, if you're really doing your job, to link those new perspectives to substantive behavioral change.

It's almost a kind of Mensa hoe-down. That means save your 27-year-olds; bring me your really bright people. Let's sit down with seven of us and solve this problem. Conversations are how value gets created these days. Insightful conversations among bright people who have good information, talking about how to solve problems.

ROBERT "SKIP" SAVOIA

VICE PRESIDENT

CSC Consulting & Systems Integration

It's no wonder that Dyle had problems dealing with consultants as a CIO. When you treat the consulting engagement as a vendor/buyer relationship, it's going to fall apart. It has to be a shared—not dictated—sense of direction and risk.

The CIO has to decide whether to abdicate or delegate responsibility for a project. CIOs who abdicate responsibility to consultants shouldn't complain when the consultants are there too long. Similarly, if clients want to fix a contract price for a project, they shouldn't be surprised when they see young MBAs in there. If I'm giving you the results you

My Metabo

Dyle doesn't address in his column. Buyers exert downward pressure on consulting fees. And if price were no object, you would need less rigorous methodologies because you would staff projects only with highly experienced, highly compensated people. Economically, that doesn't work. There aren't that many highly experienced people out there in the world, and clients aren't willing to pay the price for them.

One of the things methodology provides is a consistent, repeatable way of going through a project. It's not simply to provide a way for unseasoned people to do the work. The methodology lets you create a team led by one or two highly experienced people and some less experienced people who have some guidance and a road map for that team to produce a high-quality result with the economics that the client requires.

It gets down to process. Do you believe in process or do you believe in spontaneous acts of God? In golf, the harder you try to hit the ball, the worse you get. And the more naturally you let the club swing, the better you hit the ball. Well, the swing in golf is the process, and if you believe and work the process, you'll get terrific results. If you say, "To heck with the process, I'm just going to whale away," then you're asking for trouble.

TOM LUTZ

PRESIDENT
Lutz Group International

Let's identify what consulting really is and isn't. Young MBAs crunching code aren't consultants, they're worker bees. I think real business consultants are coaches and mentors with years of experience who are really after the long-term good of their clients and the independence of their clients.

Consulting is not building software or systems. As a CIO, I would separate actual consulting from labor—programming, systems analysis and

people a similar contextual view of what's being done.

Methodology is nothing more than a way for many different people to speak about, manage and travel along a journey of change. Methodology works as long as you don't let it become your bible, where you manage the methodology instead of the people. When this happens, you focus more on managing all 20 points on the chart rather than doing what you need to do. That's when methodologies can get out of control.

BILL SMILLIE

QUALITY ASSURANCE PARTNER
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Some of the smartest clients I've seen have said, "Give me a reference where you messed up and you made it better. Because I know that everybody occasionally messes up; what I really want to know is how you stepped up to that situation."

When we go about setting fees, we look at the level of risk and accountability that the client is asking us to take on in an engagement. At Coopers & Lybrand, we have people who can be provided on an hourly basis at the direction of our clients, and they will be charged at the lower end of our scale. They aren't fresh out of school; they have between five and 20 years of experience. The very same people can be involved in a project at a higher rate per hour because we are taking on more risk and responsibility and because we are providing more value to the client. And it is not a function of age and work experience, it's a function of the degree of risk and accountability that the consulting organization maintains.

There's an economic reality behind the use of methodologies that

want at the price and quality you want, what do you care how I carry out the work? It's the bait-and-switch that's wrong, when you're paying by the hour for experienced people and the consultant sends in juniors instead. All the more reason to get things understood upfront—to set up a joint steering committee composed of client and consultant to create a partnership rather than maintain an arm's-length relationship with the consultant.

There are many different ways to work out a consultant's fee arrangement, but it comes down to an issue of control. In the world of systems integration you have fixed parameters, and you can fix a fee or base the fee on results more easily than you can for a broad reengineering project. If you want to base my fee for reengineering the company on results, then you're going to have to give me the responsibility I need to execute. If I'm reengineering across four divisions in a company, that means four division heads will be working for me for the duration of the project. Obviously the client would be reluctant to give me

that kind of control. That's why, as you increase the scope of the project and move up within the hierarchy of the company, you move toward a more advice-based relationship. Since I don't control those people, what more can I do but send a bill for my time?

As for methodologies, they're necessary because most change these days is taking place at the enterprisewide level. You have to have a way to give thousands of



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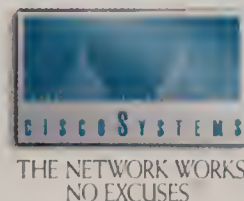
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equipment ordering—and make sure my consultants did the same thing. It's very important that the client know that he or she should be able to pick and choose various sources from the industry. After all, the consultants are doing it—they often subcontract others to do work for them.

This is part of why I believe most of the formal methodologies out there are for the good of the consultant rather than the good of the client. A methodology does a few things. For one, it enables my less experienced people to get the job done in an effective way, and I can know exactly where they are when. Second, it provides me with the capability to estimate easily what the job will cost. A methodology becomes a pull mechanism, a book for the consultants on the project. But it is not sold that way. It's sold as, "Here are the steps you

follow," and most IS organizations, being process oriented, say, "Oh good, here's a checklist I can follow."

Methodologies can also devolve into sales pitches. I've seen consultants give "status reports" on a project that were nothing more than veiled sales attempts. They'd say, "We've attained this level of success so far, but if we do this and this and bring in some more consultants, we can bring even more benefits." Their observations are usually valid. But whose time did they use to put together that "progress report?" And why are they taking up executives' valuable time with a sales pitch? I'm often brought in to coach large projects where this happens, and I'll stop it. CIOs should be shutting it down, too.

I really worry about the poor IS execs or businesspeople who do not know how to manage these outsiders. They don't know how to lay out expectations and specifications, and they don't know how to negotiate the deal. We could meet all our

business numbers helping them do just that. For business execs with little IS background who are becoming CIOs, then perhaps it's best to bring in two consulting firms to counterbalance each other.

Consultants as the messengers? I think it's very real. You will find the charlatans, the ones who call themselves consultants who are simply after the billable hours—and that's probably the majority, certainly, of

**"I've seen consultants
give 'status reports'
on a project that were
nothing more than
veiled sales attempts."**

—Tom Lutz

the independents—agreeing to take on this role. The partners in the Big Six are usually good; they won't do this. But an awful lot of the independents out there are living hand to mouth; they've got a 10-person organization, and they'll do anything for a job—even deliver the client's message to the boss.

STANLEY J. GOLDMAN

PRESIDENT AND CEO

Technology & Business Integrators Inc.

The art of managing the consultant is more heightened today than it has been for the past 20 years. If CIOs don't want to assume that management role or they feel that it's something that can be left up to the consulting company, chances are good that they'll lose their jobs. Indeed, if CIOs are leaving it up to the consultant to determine who will do what on the project, why are they surprised when a consultant brings in an MBA to crunch code at \$350 an hour? That

shouldn't happen, but if clients are willing to pay only a certain amount for a big project, it's unreasonable to expect that every person on the job will be taken from the consulting company's most experienced ranks. It's up to clients to find experienced people to do the job at the price they want to pay.

So let the buyer beware.

I think a successful consulting project takes a CIO who understands what his mission is, understands what he wants to get out of the engagement and ensures that he invests the resources and hires the right companies to do it. That means you don't necessarily give it all to one company. In some cases, the CIO owns nothing; his role is to act as a businessman coordinating activities to more effectively use information technology resources from any number of places.

I always ask the organization to appoint a liaison with whom I will have a formal meeting weekly—even more frequently if needed—because I don't want the CIO to be surprised when I'm done. If we don't have a corporate sponsor, someone who's promoting that project all the way up the decision-making chain, or if we don't have a team on the other side working with us, then all of that affects our ability to do our job. There are certain surprises you run into when the customer side doesn't do its part. So the accountability of the consultant is not in a vacuum. The customer can have a significant impact on the quality of your work. **CIO**

Christopher Koch can be reached at ckoch@cio.com.

Editor's Note:

For more viewpoints on the consulting debate and the full text of W.F. Dyle's "Meet My Methodology" column, visit http://www.cio.com/CIO/consult_methods.html on CIO's Web site. If you'd like to add your perspective, send e-mail to mccreary@cio.com. Excerpts from readers' responses will appear in a future issue of CIO.

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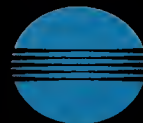
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With Business Network EDI, a company is able to exchange many types of business information with its trading partners and with other organizations within its own company. Special Trading Partner kits establish important information about trading partners and their EDI message requirements. For example, at a company that has historically used data forms for applications such as purchase orders, invoices and ship notices, the new data forms can be customized to look like the old forms and thus let users avoid complicated screens full of EDI data.

Business Network EDI was designed for Microsoft Corp.'s Windows 3.1, Windows for Workgroups 3.11 or MS-DOS 6.0 or higher. Users will need a 486/66 personal computer with at least 8MB of available RAM and 30MB of available disk space, a VGA monitor, a Hayes-compatible modem and a direct analog phone line connection. For more information, call 800 EDI-CALL.

Fashion Statement

Amdahl Corp.'s mainframe-class Millennium Global Servers and Spectris storage subsystems now have an external image that reflects their high-tech contents. Frogdesign, a strategic industrial design company in Sunnyvale, Calif., has developed a new look for Amdahl's large-scale systems that is environmentally sound and cost-effective and allows flexibility of location.

Millennium Global Servers are based on complementary metal oxide semiconductor (CMOS) technology, are physically much smaller than current systems and have more capacity and performance per square foot than traditional mainframe computers. Spectris, based on redundant arrays of inexpensive disks (RAID) technology, provides the high availability that complex computing environments demand. Amdahl and



Frogdesign sought to convey those concepts visually by fashioning a bold, strong design.

The first of the Millennium Global Servers is slated to ship in mid-1996. For more information, call 408 746-6000.

Safety in numbers

It's not surprising that system outages can lead to considerable financial losses. Failure in a catalog sales operation, for example, can cost a company \$90,000 per hour of downtime. A new software product from CLAM Associates, Geographic High Availability (GeoHA), safeguards against expensive downtime by providing continuous access to critical applications and data despite system failure or even actual site loss.

GeoHA works by placing several open-systems application servers in widely dispersed geographic locations; each server has an identical but separate image of the application and data. In the event of a disaster, GeoHA automatically switches users, applications and data to another location in seconds, with no loss of data integrity. GeoHA has three functional components: Geographic Cluster Management (GeoManager), Geographic Mirroring (GeoMirror) and Geographic Message (GeoMessage). GeoManager acts as a supervisor for the distributed cluster, monitoring the status of all the servers in the separate locations. GeoMirror works on top of the operating system logical volume disk manager and replicates

and coordinates data updates at each location, assuring that the sites are synchronized. GeoMessage provides reliable communications including a "heartbeat" that is transmitted between locations. GeoManager uses this heartbeat at each location to determine the status of other cluster locations.

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Editorial, Advertising and Business Offices: 492 Old Connecticut Path, PO Box 9208, Framingham, Massachusetts 01701-9208, (508) 872-0080. **Postal Information:** CIO (ISSN 0894-9301) is published semimonthly; monthly in July and August; and as a combined issue December 15/January 1 by CIO Communications Inc., 492 Old Connecticut Path, PO Box 9208, Framingham, Massachusetts 01701-9208. Second-class postage paid at Framingham, MA, and at additional mailing offices. **Reprints:** Copyright 1996 by CIO Communications Inc. All rights reserved. Reproduction of material appearing in CIO is forbidden without written permission. Send all reprint requests to Permissions Editor, CIO, 492 Old Connecticut Path, PO Box 9208, Framingham, Massachusetts 01701-9208. **Photocopy Rights:** Permission to photocopy for internal or personal use or the internal or personal use of specific clients is granted by CIO for users through the Copyright Clearance Center (CCC), provided that the base fee of \$3.00 per copy of the article, plus \$.50 per page is paid directly to Copyright Clearance Center, 27 Congress Street, Salem, Massachusetts 01970. Please specify: ISSN 0894-9301. Permission to photocopy does not extend to contributed articles followed by this symbol: ‡. **Subscriptions:** Address inquiries to CIO, 492 Old Connecticut Path, P.O. Box 9208, Framingham, Massachusetts 01701-9208. CIO is free to qualified information executives. To all others the one-year basic rate is \$98 for U.S. and Canada, \$110 to foreign countries (payable in U.S. funds only). The single copy price is \$8. Please allow 4 to 6 weeks for new subscriptions to begin. **Change of Address:** Please fax a copy of current subscription label along with new address to (508) 872-0618. Allow 4 to 6 weeks for change to take effect. **Postmaster:** Send change of address to CIO, P.O. Box 489, Northbrook, Illinois 60065-9816.

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Their Methods **AREN'T** Madness

CIO-turned-consultant W.F. Dyle explained in a recent "CIO Confidential" column why he has little use for consulting methodologies. His new colleagues beg to differ.

BY CHRISTOPHER KOCH

THE "CIO CONFIDENTIAL" column that appeared in our Nov. 15, 1995, issue, titled "Meet My Methodology," by W.F. Dyle (the pen name of a former CIO), drew varying levels of agreement, pique, contempt and outright outrage from a group of consultants we canvassed in the aftermath of the column's appearance. We have excerpted some of the consultants' remarks here, following a brief summary of Dyle's original points (charges, insults):

- "A methodology is a form of linguistic bedazzlement with which consulting companies misdirect your attention while pursuing their core competency of pulling a rabbit out of your hat (also known as 'acquiring your assets')."
- "I have heard that some big consulting engagements become tutorials for the consulting firms' young, ambitious post-MBAs, and you (or I) get some unplanned job-enrichment experience as teachers."

- "[A government agency CIO] asked me about my consulting methodology. I told him I didn't have one but added that I would try to find what his problem was, figure out a way to fix it, make certain the fix would work and then send him a bill. That's what I do. He recoiled."

- "I have yet to find a consultant (among the 'real' consultants I've known) who was paid on the basis of results measured, say, two years after they told you what you should do and you had done it."

- "The key IT executives of the company my friend is advising had a relationship with the vendor through a previous employer; they say that the vendor's new product is the 'only' solution that can meet their needs—and there are zero alternatives."

- "The company I used to work for hired consultants because the people there didn't want any

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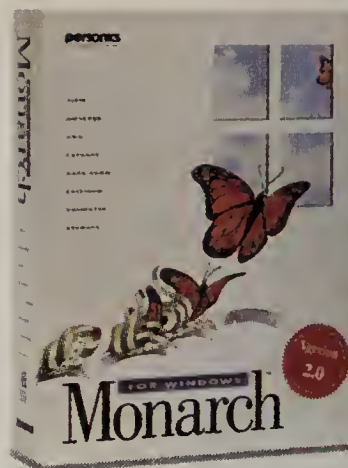
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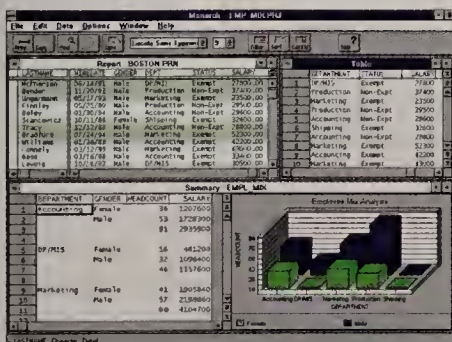
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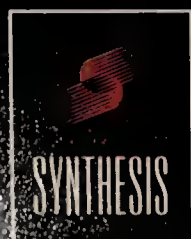
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